MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The general weather conditions which prevailed over the United States and Canada during September, 1883, are presented in this REVIEW, based upon reports received from the regular stations of the Signal Service, from the Canadian Meteorological Service, and from co-operating state weather services and voluntary observers.

The mean temperature of the month has been generally below the average in all districts east of the Rocky mountains, the greatest departures occurring from the Missouri valley eastward to the lower lake region. On the Pacific coast the mean temperature has been above the normal.

The monthly rainfall has been less than the average for September in nearly all parts of the country, the deficiencies being greatest in the east Gulf states.

Owing to the small monthly precipitation over most of the country, drought prevailed to a great extent; and in many localities forest fires burned over large tracts of land, causing the destruction of much property, especially in the New England states.

On chart v. are shown the limits within which frosts occurred during the month.

The storm traced as number iv. on chart i., was a tropical hurricane which moved slowly northwestward over the West Indies, to the North Carolina coast, between the 5th and 10th. This storm, which was very disastrous to shipping, is fully described under "areas of low barometer."

The small number of reports from vessels encountering icebergs during September indicates that the north Atlantic ocean is comparatively free of ice. Chart ii., therefore, which heretofore has shown the limits of ocean ice, shows only the approximate paths of the storms occurring in the north Atlantic.

In the preparation of this REVIEW the following data, received up to October 20th, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and forty-six monthly journals, and one hundred and thirty-five monthly means from the former, and fifteen monthly means from the latter; two hundred and forty-seven monthly registers from voluntary observers; fifty-two monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Indiana, Kansas, Nebraska, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The distribution of mean atmospheric pressure for the month of September, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart iii. A small area of barometric maxima, inclosed by the isobar of 30.1, occupies a part of northern Montana. Two isobars of 30.05 are shown on the chart. The more northerly of these extends in an easterly direction from northeastern Minnesota to Nova Scotia; and the other is traced from the northern boundary of Washington territory southeastward to near the western Gulf coast, thence northeasterly in an irregular line to the lake region, thence southward to northern Georgia, and thence northeastward to the north Carolina coast. The highest barometric means reported are 30.15, from Fort Shaw, Montana, and 30.1 from Fort Buford, Dakota. Within the area between the isobars of 30.05 the mean pressures vary from 30.05 to 30.09. The mean atmospheric pressure has been least in California and southern Arizona; the lowest barometric mean, 29.78, is reported from Yuma, Arizona.

Compared with the mean pressure for August, 1883, there has been a decrease on the Pacific coast varying from .01 to .08; there has also been a very slight decrease in Florida. Along the Gulf and south Atlantic coasts and in the Ohio valley and Tennessee no change has taken place. Elsewhere over the country the mean pressure is greater than that of August, the excess being greatest over the northern and middle slopes, extreme northwest, and in New England and the Canadian maritime provinces. The greatest increase occurred at Cheyenne, Wyoming, where it amounted to .15.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

The mean atmospheric pressure of September, 1883, compared with the September normal shows a slight deficiency on the Pacific coast (except at Red Bluff, California, where it is .03 above), in Maine, and east of the Mississippi river south of the Ohio valley. The greatest departures below the normal are .05 at Portland, Oregon, and .06 at Louisville, Kentucky. In all other districts the mean pressure is above the normal for September, the departures being greatest from the upper lake region southwestward to Colorado and Wyoming, where they vary from .08 to .10.

BAROMETRIC RANGES.

The monthly barometric ranges have been greatest in New England, the lake region, and on the North Carolina coast in the vicinity of Smithville. The largest monthly range (1.25) is reported from Eastport, Maine. The smallest monthly ranges are reported from California and from stations along the Gulf coast, the minimum, 0.19, occurring at Los Angeles, California.

In the several districts the monthly barometric ranges have varied as follows:

New England.—From 0.98 at Block Island, Rhode Island, to 1.25 at Eastport, Maine.

Middle Atlantic states.—From 0.60 at Norfolk, Virginia, to 1.16 at Albany, New York.

South Atlantic states.—From 0.40 at Atlanta, Georgia, to 0.86 and 1.08 at Wilmington and Smithville, North Carolina, respectively.

Florida peninsula.—From 0.33 at Key West to 0.41 at Sanford.

Eastern Gulf.—From 0.32 at Vicksburg, Mississippi, to 0.43 at Montgomery, Alabama.

Western Gulf.—From 0.32 at Little Rock, Arkansas, to 0.40 at Fort Smith, Arkansas.

Tennessee.—From 0.37 at Memphis, to 0.45 at Knoxville.

Ohio valley.—From 0.59 at Louisville, Kentucky, to 0.73 at Columbus, Ohio.

Lower lakes.—From 0.83 at Sandusky, Ohio, to 1.19 at Oswego, New York.

Upper lakes.—From 0.77 at Duluth, Minnesota, to 1.08 at Alpena and Mackinaw City, Michigan.

Extreme northwest.—From 0.87 at Saint Vincent, Minnesota, to 0.93 at Fort Buford, Dakota.

Northern slope.—From 0.58 at North Platte, Nebraska, to 0.92 at Fort Benton, Montana.

Middle slope.—From 0.48 on the summit of Pike's Peak, Colorado, to 0.77 at West Las Animas, Colorado.

Southern slope.—0.50 at Fort Stockton, Texas.

Southern plateau.—From 0.35 at Fort Grant, Arizona, to 0.58 at El Paso, Texas.

Northern plateau.—From 0.60 at Dayton, Washington Territory, to 0.62 at Spokane Falls, Washington Territory.

North Pacific coast.—From 0.55 at Roseburg, Oregon, to 0.62 at Fort Canby, Washington Territory, and Portland, Oregon.

Middle Pacific coast.—From 0.33 at Sacramento, San Francisco and Red Bluff, California, to 0.47 at Cape Mendocino, California.

South Pacific coast.—From 0.29 at Los Angeles, California, to 0.38 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

Seven areas of high barometer appeared within the limits of or near the northern boundary of the United States during the month. They were generally first observed in the northwestern territory north of Montana. Those appearing in this region moved in a southeasterly direction until the centre of greatest pressure passed east of the Mississippi valley, after which the general course was easterly or slightly to the south of east. Two areas of high pressure approached the north Pacific coast from the west, one of which disappeared on that coast. The second of these areas was attended by the maximum pressure observed during the month at stations in the extreme northwest. It crossed to the east of the Rocky mountains near the northern boundary and disappeared north of Dakota.

I.—This area was observed in the extreme northwest on the morning of the 2d, the barometer being above 30.4 near the centre. The temperature fell in the regions west of the lake region on the 3d, with increasing pressure as this area moved to the southeastward over the Missouri valley, light frosts occurring in Dakota on the 2d. After reaching the Mississippi valley the course changed to easterly, and on the morning of the 4th the barometer was high in the middle states, although this area was less clearly defined and the barometer two-tenths of an inch lower than when first observed in Dakota. It passed to the east of the Atlantic coast stations during the 4th, when the temperature rose with clear weather and southerly winds.

II.—This high area appeared in the upper Missouri valley on the morning of the 4th and followed the course of the preceding area, passing over the Missouri valley and thence eastward to the middle Atlantic states, where it was central on the morning of the 6th, when it extended over the greater portion of the country east of the Rocky mountains. The pressure had declined slightly at the centre as the area moved eastward, but the barometer was higher in the middle states than it was on the 4th when area i. extended over this section, while the latter was attended by greater pressures at the interior stations. During the 7th the easterly movement was retarded, and the temperature fell slightly in the southern states east of the Mississippi river, attended by clear weather, the wind becoming light and variable and the area could no longer be defined by isobarometric lines.

III.—This was the most northerly area of high pressure observed during the month. On the 7th it was central north of Manitoba, and it passed over the lake region on the 8th and 9th, attended by clear weather and frosts in New England and thence westward to the upper Mississippi valley. On the 10th it was central north of Lake Ontario, well-defined, and almost circular in form. During the 11th and 12th it passed directly eastward over New England to the north Atlantic with but slight variation of pressure, but with marked changes in general form as defined by the inclosing isobars. While this area was observed the pressure at the centre ranged from 30.4 to 30.5, but the barometer fell slightly after passing east of the coast.

IV.—This area appeared in Dakota on the 16th and extended over the northwest and upper lake region on the 17th, attended by cool, clear weather and frosts in Minnesota. On the 17th the barometer was highest, 30.23, in Iowa; during the 17th and 18th this area passed to the northeast over the upper lake region attended by increasing pressure at the central stations. It may be well to note that this is the only area which has been traced over a northeasterly course during the month, as it is also the only case observed within which the pressure at the centre increased as it advanced. On the morning of the 19th the pressure reached its maximum of 30.43 north of the lower lake region, while the barometer ranged from 30.3 to 30.4 in New England. This area dissipated while extended over the northeastern stations on the 20th, or passed to the northwestward and joined the high area which had appeared in British Columbia on the preceding day.

V.—The morning reports of the 19th indicated the advance of a high area from the north Pacific, the barometer at Victoria reading 30.3 with temperature at 40°. On the following morning (Thursday) killing frosts and freezing weather were reported from Montana, where the pressure exceeded 30.6. This high area remained central in the extreme northwest during the 20th and 21st, while the pressure increased rapidly at stations south of the Missouri valley, with cold northerly wind and clear weather. The temperature fell rapidly at stations west of the Missouri, and frost occurred on the 21st (Friday) in Dakota, Nebraska, Minnesota, Kansas, Indian Territory, northern Texas, and in Missouri; and on Saturday night in Arkansas, Wisconsin, Missouri, and Iowa. The high area did not pass over the districts of the United States, but it apparently moved slightly to the north after crossing to the east of the Rocky mountains, and after remaining almost stationary during the 21st and 22d, the pressure declined from 30.6 to 30.1, the temperature remaining near freezing at the northern stations west of Lake Superior. The appearance of this unusually cold wave in the northwest, attended by unusually high pressure, formed the basis of the following frost warning issued by this office on the 20th:

"*To the Manager, Western Union Telegraph Company, Madison, Wisconsin:*

A cold wave is advancing from the extreme northwest which will probably cause damaging frosts in the upper Mississippi and Missouri valleys, and upper lake region on Friday or Saturday (21st and 22d).

(Signed) DUNWOODY,
Assistant."

Although the development of the low area in the lake region retarded the movement of this cold wave, it may be seen from the accompanying chart (v.) that frosts occurred over the greater part of the sections named in the telegram announcing that frosts would occur. The full line on this chart encloses the region within which numerous frosts occurred as stated in the warning. Professor Nipher, of the "Missouri Weather Service," states that the frosts were severe in some sections of his state, on the date named, and reports from Arkansas and Wisconsin show that frosts occurred within fifty miles of Memphis, Tennessee, and Chicago, Illinois. The cold wave was not dissipated, but only retarded in its advance eastward, as the reports from the states of the Ohio valley show that damaging frosts occurred in these sections on the 25th and 26th.

VI.—This area was central north of Montana on the 24th, and was apparently a part of high area v. It advanced after the low area, previously referred to, had filled up, moving to the southeast over the Missouri valley on the 25th and 26th, causing killing frosts in Michigan, Iowa, Wisconsin, and northern Illinois, and light frosts in the states of the Ohio valley, Missouri, Kansas, Nebraska, and Colorado. Clear, cool weather prevailed on the 26th, when the centre of greatest pressure was near Cairo, Illinois. During the 27th and 28th this area extended eastward over the Atlantic states, and it finally disappeared off the South Atlantic coast on the 28th.

AREAS OF LOW BAROMETER.

Nine areas of low barometer have been observed within the limits of the United States, or near its boundaries, during the month of September. The mean latitude of the tracks of these areas is slightly to the north of the region of average storm frequency of the month. One depression developed and disappeared within the limits of the stations after moving to the west and south near the centre of the continent; and the only tropical storm observed during the month has been clearly traced from the West Indies to the south Atlantic coast, where, judging from the number of reports at hand, it lost its energy when the centre was near the most westerly part of its course. Chart i. exhibits the tracks of the centres of the low areas traced during the month. In the case of low-area iv., the centre of disturbance has been given at the 7 a. m. observation, and these locations have been determined only approximately, owing to the small number of reports received.

The following table shows the latitudes and longitudes in which each depression was first and last observed, and the average hourly velocity of each depression within the limits of the stations of observation:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I.	51 00	90 00	49 00	58 00	17.5
II.	54 00	103 00	50 00	60 00	35.0
III.	47 00	102 00	50 00	68 00	25.0
IV.	.....	.....	34 30	77 00	9.2
V.	52 00	103 00	51 00	94 00	17.0
VI.	53 00	100 00	50 00	63 00	35.0
VII.	40 00	86 00	37 00	93 00	27.0
VIIa.	54 00	100 00	51 00	88 00	23.0
VIII.	42 30	91 00	50 00	58 00	28.5
IX.	38 00	104 00	38 00	73 00	34.5

I.—The track of the centre of this depression is only approximately given, as only the southern part of the disturbance was felt by the most northerly stations. At midnight of the 1st a slight disturbance extended over the upper lake region, attended by light rains, the barometer being high east of New England and in the upper Missouri valley. The wind shifted to northerly in the upper lake region and northwest, with local rains on the morning of the 2d, while the barometric changes indicated that the low area was moving eastward toward the lower Saint Lawrence valley. This storm became more extended to the southward as it approached the coast, the rain area including the middle states, New England, and all stations in the northeast. On the morning of the 3d strong southwest to northwest winds occurred off the Atlantic coast north of Hatteras, North Carolina, and the Maritime Provinces, where the barometer had fallen to 29.5 near the centre of disturbance. On the afternoon of the 3d the centre of this storm was north of Sidney, Nova Scotia, where the wind was from the southwest; force, twenty-four miles per hour; at 3 p. m. the barometer read 29.56. This storm increased in energy as it advanced to the eastward, and when last observed the barometer at the centre had not reached its minimum.

II.—This depression was central north of Manitoba on the morning of the 3d. As in the preceding storm the track of the centre of disturbance was to the north of the stations of observation, and the easterly movement can only be traced by the changes occurring in the southern limit of the storm. It passed eastward north of the lake region during the 3d and 4th, attended by local rains in the northern states, and it was probably central north of Farther Point at midnight of the 4th. The pressure increased in the Saint Lawrence valley on the 5th, when the brisk and high northwest winds indicated that the storm had passed rapidly to the east over the north Atlantic.

III.—This disturbance developed in the upper Missouri valley on the night of the 5th, the centre being near Bismarck, Dakota, at the 7 a. m. report of the 6th, when the barometer indicated a pressure of 29.8. During the 6th it moved slightly south of east to southern Minnesota, becoming clearly defined and inclosed by circular-formed isobars of 29.8 and 29.9, while the pressure was above 30.2 north of Minnesota. By the morning of the 7th the centre was located in southern Wisconsin, and on the afternoon of the same date the disturbance reached the most southern point of its course in southern Michigan, while the general form of the depression had changed to that of an ellipse, extending from Missouri to Lake Ontario. Strong northerly winds occurred in the upper lake region after the centre passed to the east of that region, and the energy of the storm increased very much during the 7th, without any marked change in the barometer at the centre of disturbance. The gradient increased, however, in the western portion of the storm, owing to the advancing high area from the northwest. At midnight of the 7th the course changed to the northeast, and during the 8th this storm passed along the Saint Lawrence valley, the centre following the general line of that river. The pressure continued near 29.8 at the centre during the entire course of the storm from the northwest until it disappeared northeast of the Maritime stations.

IV.—The first indications of this hurricane were observed at Saint Pierre, Martinique, on the afternoon of the 4th. The following report thereof was furnished by Captain Alexander, of the brig "L. & W. Armstrong": "Tuesday, September 4th. Harbor of Saint Pierre, Island of Martinique.—Forenoon, fine weather, barometer (aneroid) 30.06. Afternoon, intermittent showers, wind ene., force 3. At 5 h. 0 m., a heavy swell began to come from wnw., and broke very heavily on the beach; glass 30.04, wind ne. At 6 h. 30 m., wind n., heavy rain squalls, glass 30.04, sea increasing; 7 h. 15 m., wind nnw., force 7, glass 29.8; at times very heavy rain; 7 h. 45 m., wind nw., force 9, glass 29.7; 8 h. 30 m., wind w., force 9, glass 29.54; incessant rain, sea breaking very heavily. At 9 h. 30 m., wind from w. to wsw., blowing in furious gusts; the glass fluctuated so much that at first I thought it was broken, but I noticed that it fell to 28.2 and rose again to 29.02. At that time we had to close the cabin doors, as the decks were flooded with water; at about 10 h. 30 m., the wind blew steadily from wsw., with hurricane force. All hands were lashed to the vessel to prevent being washed overboard; the sea was furious and very broken. At this time I saw the first of the vessels go ashore, and in a few minutes they broke up. I had no chance to go below to look at the glass until 14 h. 15 m., when it read 29.5; about half an hour before this, the wind hauled to sw., with the first flash of lightning that I observed. At 16 h. 0 m., the wind would lull at times and the rain would cease, then again it would blow in furious gusts accompanied by heavy rain. At 16 h. 30 m., the wind hauled to s., with very bright flashes of lightning; sea going down, glass 30.0, wind s., force 10, sea rough but not breaking. At 22 h. 0 m., glass 30.06, wind force 3, clearing."

The above report shows that the hurricane passed from se. to wnw. of Martinique and, by the morning of the 5th, it had entered the Caribbean sea. At Basse Terre, Guadeloupe, all the wharves were destroyed.

The following report, furnished by Captain G. S. Locke, of the s. s. "Muriel," at Saint Thomas, indicates that the centre passed at some distance south of that island: "5th.—This day began with a fresh breeze from ene. and with a very threatening appearance; a hurricane reported to windward. At 4 p. m. the wind hauled to ese., with heavy squalls and much rain. The barometer gave no indication of bad weather, particularly

of the close proximity of a hurricane, as it fell only about .15 inch during the twenty-four hours. The hurricane must have passed about two degrees south of this island. During the night the sea-swell was very heavy from the southwestward; at 11 p. m. the weather cleared up; barometer rising."

During the 5th the hurricane moved slowly westward, south of Porto Rico, as indicated by the report of Captain C. V. Decker, of the brig "Rising Sun:" "At San Juan de Porto Rico the barometer was slightly affected by the cyclone passing to the southward of the island on September 5th. While the storm was advancing toward the island the weather was threatening, the sky being covered with heavy black clouds, the wind blowing a moderate gale from northeast to southeast. At 11 h. 23 m., Greenwich mean civil time, the weather partially cleared."

By midnight of the 5th the storm-vortex was near to Saint Domingo. At midnight of that date the wind blew from ne., and at 7 a. m. of the 6th it suddenly veered to sw., blowing with great fury and lasting until 10 a. m. Much damage was done at sea and on shore; vessels at anchor were driven from their anchorages and blown out to sea; the s. s. "Foscolia," off Saint Domingo, sustained severe damages, and a large number of small craft were lost; in nearly all cases all hands perished. The hurricane is reported to have given no warning of its approach, except that the sea rose before the wind.

The report of Captain Cameron, of the Royal Mail Steam Packet Company's s. s. "Belize," is given herewith, and shows that the vessel crossed the track of the hurricane between Cape Maysi, Cuba, and Castle Island Light (Crooked Island,) on the 6th, and that the storm-centre was, for several days, to the westward of the ship:

"September 5th.—11 hours, Greenwich mean time, left Port Antonio, Jamaica, barometer (corrected) 29.87; 17 hours, moderate ne. wind, with passing clouds moving toward the sw., barometer 29.85; 21 hours, fresh ne. wind with ne. sea, barometer 29.8.

"6th.—5 hours, fresh ne. wind and cloudy, with high sea, barometer 29.8; 9 hours, moderate ne. wind and squally, with rain, barometer 29.7; 13 hours, passed Cape Maysi light, barometer 29.64; 17 hours, strong n. gale, with furious squalls and heavy rain, very heavy cross sea, barometer 29.39; 21 hours, strong sse. gale, with rain at times and a high, confused sea, barometer 29.41.

"7th.—5 hours, fresh se. gale, with constant heavy rain and high se. sea, barometer 29.58; 7½ hours, passed Castle island light-house; 9 hours, strong se. wind, heavy sea, and constant rain, barometer 29.61; 12 hours, passed Bird Rock light; 17 hours, strong se. gale, with furious squalls and vivid lightning, barometer 29.62; 21 hours, strong se. gale, with furious squalls, thunder, much vivid lightning, and heavy rain, barometer 29.62, ship laboring heavily.

"8th.—5 hours, fresh se. gale, with very heavy se. sea, cloudy; 9 hours, strong se. wind, cloudy, and high sea, barometer 29.68; 17 hours, strong se. wind, cloudy, heavy sea, barometer 29.72; 21 hours, strong se. wind, cloudy, heavy sea, barometer 29.72.

"9th.—5 hours, sudden shift of wind to ssw., with rain and high sea, barometer 29.74; 7 hours, wind shifted to se.; 9 hours, strong se. wind, squally, with heavy rain, barometer 29.76; 17 hours, no change, barometer 29.74; 21 hours, fresh se. wind, with furious squalls and heavy sea, barometer 29.72.

"10th.—5 hours, strong se. wind, overcast, barometer 29.7; 9 hours, strong se. gale, with heavy rain and very heavy sea, barometer 29.66; 17 hours (about N. 33°, W. 74°), very heavy se. gale, with terrific squalls of heavy rain and very heavy cross sea (se. and sw.), barometer 29.6; 21 hours, very heavy sse. gale, with hard squalls and heavy cross sea, barometer 29.61.

"11th.—5 hours, wind and sea decreasing, overcast, barometer 29.66; 9 hours, fresh se. wind, fine weather, high sea, barometer 29.7; 17 hours, moderate se. wind, high sea, barometer 29.76; 21 hours, moderate e. wind and fine weather, barometer 29.77."

During the 7th the hurricane passed slowly north-northwestward along the western shores of the Bahama islands, causing numerous shipwrecks and great loss of life along the Exuma cays. At Great Harbor cay, 50 miles southeast of Nassau, the wind blew with hurricane force from ene., veering with the sun to sw.; all fruit trees were uprooted and much damage was done. By the morning of the 8th the hurricane was central south of Nassau, New Providence, Bahamas.

The following report is taken from the "Nassau Guardian," of September 8th, and was forwarded to this office by Captain Faircloth, of the s. s. "Cienfuegos:" "* * * The weather was squally during the whole of yesterday (7th), and the sun, at setting, shed a lurid glare over the western sky. There were occasional showers during the evening and a breeze sprang up from ene., increasing till midnight, when a gradual fall in the barometer commenced. * * * At 11.30 a. m. (8th) the wind gradually shifted from ne. to nw., and the cyclone was at its height at 2 p. m., the barometer indicating 28.868. It then began to rise, and the wind veered to wsw. at 6.30 p. m., blowing from that point for four and a half hours. Rain fell heavily nearly all day and caused great destruction of property by beating into the houses and stores; there is scarcely a house which has not sustained damage. Walls, fences, and trees have been blown down in all directions, and many of the houses of the poor completely prostrated. Many wharves are totally destroyed and others are greatly damaged; the destruction to shipping far exceeds that caused by the hurricane of 1866. * *"

The following observations were recorded on board the light-house tender "Richmond," anchored near Nassau:

Date.	Hour.	Wind.	Force.	Barometer.
September 8th	1.00 p. m...	n.	12	29.980
Do	1.20 p. m...	n.	hurricane	28.940
Do	1.30 p. m...	n.	"	28.930
Do	1.45 p. m...	nnw.	"	28.898
Do	2.00 p. m...	nw.	furious gusts	28.868
Do	2.20 p. m...	nw.	"	28.908
Do	2.30 p. m...	wnw.	"	28.914
Do	3.00 p. m...	wnw.	"	28.926
Do	3.30 p. m...	wnw.	"	29.034
Do	3.45 p. m...	w.	"	29.104
Do	4.00 p. m...	w.	"	29.130
Do	4.30 p. m...	w.	"	29.258
Do	4.40 p. m...	w. by s.	"	29.300

N. B.—It is not known whether the above barometric values are as read off, or whether the necessary corrections have been applied.—C. S. O.

The "Nassau Guardian," of the 15th, publishes a list of nearly one hundred vessels that have been either totally wrecked or seriously damaged in this hurricane; the same paper also states that the number of lives lost has been very great, fifty-three having been reported up to that date.

During the 8th the storm-vortex appears to have passed between Nassau and Eleuthera island, and by the morning of the 9th it was probably central north of, and near, Abaco island. Mr. J. Peterson, of the brig "Giles Loring," reports as follows: "On the 9th, between Abaco and Stirrup cays, had a gale from e.; ran in on the Bahama banks for anchorage; anchored in four and a half fathoms; barometer, 29.5, blowing a hurricane; cut away spars to save vessel and cargo. At 11 a. m. the wind suddenly shifted round to nw. in a furious blast, covering the vessel fore and aft with spray. Latter part of the day, fresh gale and clearing weather, wind w."

Mr. Peterson also reported having been informed by wreckers that at the Beminis (west of Nassau), the wind blew from n. to nw. a moderate gale. Although much damage was done to property among the islands north of New Providence, it is reported, however, that the hurricane was not so disastrous as when south of that island.

During the 9th the hurricane appears to have moved nearly due northward; the following reports serve to indicate its course and show that it exhibited great energy after leaving the Bahamas:

Captain Klocking, of the German bark "Wieland," forwards the following from Charleston, South Carolina: "After sailing through the trade winds with light ne. and ene. breezes,

weather very hot until the 7th, we fell in with an e. by s. breeze, force 5 (N. 27° 35′, W. 69° 58′), barometer 29.9 (error unknown), se. sea swell. 8th, N. 28° 29′, W. 72° 53′, wind se. 6, squally, barometer 29.85, s. sea swell, lightning in the western horizon. 9th, N. 29° 34′, W. 75° 54′, wind ese. 7, thunder squalls with rain, barometer 29.75, s. sea swell, high. 10th, N. 30° 18′, W. 76° 18′, wind se. blowing a violent gale, barometer 29.55, lightning all around the horizon, rain squalls, sea from all directions. 11th, N. 31° 31′, W. 74° 38′, wind s. 8, barometer 29.70, sse. sea swell. 12th, N. 32° 5′, W. 76° 18′, wind sw. by s. barometer 29.75, weather fine, all canvas set. (Observations taken at 0 hr. 8 min. Greenwich mean time.)"

Captain J. W. Reynolds, of the s. s. "City of Washington," reports as follows: "Sunday, September 9th, 4 a. m., barometer 29.8, the wind came out strong from se. with heavy rain and cross sea; at 9 a. m., hove ship to (N. 29° 30′, W. 78° 5′), blowing hard from ese., barometer 29.7, raining hard. At 8 p. m., blowing a hurricane with an ugly cross sea breaking over the ship, barometer 29.3, wind e. heavy rain. Monday, September 10th, 4 a. m., blowing a hurricane, a very heavy cross sea running and breaking over the ship, wind ne., raining heavily, barometer 29.0; 8 a. m., (near N. 30° 45′, W. 78° 52′) blowing hard from ne., barometer 29.05; noon, wind n. barometer 29.4; 4 p. m., wind nw., blowing freshly, barometer 29.6, kept ship on her course."

Captain Quick, of the s. s. "New York," reported: "September 8th (N. 31° 45′, W. 80° 00′), from noon of this day until midnight, weather squally, wind light from e. to ne., barometer falling. 9th came in squally; when Cape Canaveral bore west, at 3.30 a. m., a very heavy swell came in from ese. to ne., weather very threatening, thunder and lightning. The barometer had fallen very slowly to 29.7, and remained at 29.7 until I was within thirty miles of Jupiter inlet, when the wind hauled from ne. by way of n. to w. At noon of this day, at Jupiter inlet, the barometer began to rise, with clearing weather, but still squally from the west."

Captain A. C. Burrows of the s. s. "Rio Grande," bound from New York to Galveston, furnishes the following interesting observations concerning this hurricane: "For several hundred miles outside of its approaching periphery, the sunsets were yellow and the reflection on the clouds in the east was fiery red, while the rising of the sun was characterized by a startling redness of the eastern sky (always considered a sign of bad weather). The sun's early rays were scalding and stifling, although the thermometer did not indicate unusual heat; the atmosphere during the nights was close and oppressive and the stars presented a 'sprawling' and 'spattered' appearance, while the young moon was seen surrounded by a vapory halo of continually changing density. The action of the barometer showed that the cyclone was pushing its irresistible progress north against a district of high barometer, for the reason that, from the time the "Rio Grande" left New York (10 p. m., 5th,) until the storm-centre bore nearly east of her, seventy-six hours later, the barometer was gradually forced down in the following manner: it would fall a tenth and then rise (probably on account of local influence) half as much, then fall more, and so repeat. At 5 a. m., of the 9th, the ship's position was sse. of Canaveral, fifty-five miles from it and about ten miles from the shore; here the barometer began to fall very rapidly from 29.80, the wind breezing up from nne., accompanied by heavy rains and an increasing swell from about east. At 6 a. m. the "Rio Grande" was hauled off shore, as it was considered safer to get away from the immediate vicinity of the coast, particularly as it was impossible, at that time, to tell in just what direction the storm was advancing. Care was taken, however, not to go farther than was necessary to secure an offing, as the probabilities were that any progress to eastward would bring the ship nearer to the vortex of the storm. Fortunately this passed so far to the east of us that the wind only reached the force of a heavy gale, and the storm advanced northward so fast that that force only lasted till about 8 p. m., when the breaking clouds and moderating wind showed that the storm had passed by, and we were able to resume our course without having suffered any loss beyond that of sixteen hours' time."

During the 10th the hurricane continued its northerly movement toward the southern coast of North Carolina, and by the morning of the 11th the centre was near Smithville, North Carolina. The following observations were taken at that station during the hurricane:

Observations taken at Smithville, N. C., during the most violent portion of the storm of September 10, 11, and 12, 1883.

Date.	Time.	Barometer corrected for temperature, instrumental error, and elevation.	Exposed thermometer.	Wind.	
				Direction.	Velocity in miles per hour.
1883			°		
September 10	7.00 a. m.	30.031	69.0	ne.	20
Do.	3.00 p. m.	29.829	64.0	ne.	28
Do.	11.00 p. m.	29.586	65.5	ne.	32
September 11	6.10 a. m.	29.170	71.0	e.	56
Do.	6.35 a. m.	29.170	71.0	e.	60
Do.	7.00 a. m.	29.184	71.0	e.	58
Do.	7.30 a. m.	29.157	71.0	e.	84
Do.	8.00 a. m.	29.175	70.8	se.	84
Do.	8.20 a. m.			se.	93
Do.	9.00 a. m.	29.191	70.5	se.	80
Do.	9.15 a. m.	29.217	70.5	se.	70
Do.	9.30 a. m.	29.247	70.0	se.	82
Do.	10.00 a. m.	29.284	69.0	se.	79
Do.	10.30 a. m.	29.309	69.4	s.	77
Do.	11.00 a. m.	29.355	68.7	s.	72
Do.	3.00 p. m.	29.503	68.0	sw.	50
Do.	11.00 p. m.	29.725	66.0	sw.	25

The gale began at 9.30 a. m. of the 10th; it reached its maximum force at 8.20 a. m. of the 11th, and ended at 1.20 a. m. of the 12th.

During its progress from the Bahamas, the centre does not appear to have deviated from a northerly course, since its extreme violence was not felt at stations on the coast of Florida, Georgia, and South Carolina, nor by vessels east of the seventy-fourth meridian, as indicated by following reports, but it was very disastrous to vessels between Hatteras and Wilmington, North Carolina:

Captain J. W. Lindsley, of the brig "Alcira," reports: "On the 9th, 10th, and 11th (between N. 35° 01′, W. 74° 10′, and N. 36° 32′, W. 73° 30′), the wind blew heavy in squalls from all points of the compass, with a destructive sea running from all quarters. The barometer fluctuated rapidly, but did not at any time fall below 30.06; the clouds were very low, but I had no means of testing their velocity or that of the wind. I regret very much that, owing to loss of sails, &c., and the lack of proper instruments, I was not able to make any close observations, as there were some peculiarities attending this storm that I would have liked to note more particularly, but I hope that others have been able to do so."

Captain A. B. Chase, of the schooner "Norena," reported: "From the 8th to the 13th (from N. 31° to N. 39° and between W. 67° and W. 68°), experienced a very heavy swell, commencing at ssw., and running gradually around to w. The weather during this time was fine, but a heavy bank of clouds appeared in the western board, with mare's tails flying rapidly from sw., along the horizon to an elevation of 15° to 30°. The barometer, though high, oscillated more or less."

In Captain Chase's report, the barometer ranged from 30.1 to 30.3, wind ese. to se., s. and ssw., force 3 to 4, weather very fine.

The observer at Jacksonville, Florida, reported on the 9th brisk ne. wind blowing in squalls, heavy rain at intervals; barometer fell slowly until 3 p. m., (29.88) after which it rose slightly. On the 10th the barometer remained stationary and the ne. wind backed to nw. and moderated to a light breeze. The maximum velocity of the wind at this station was 22 miles n. At display stations on the coast of Florida the velocities

were as follows: Saint Augustine, ne., 40; Fort George island, n., 30, and at Fernandina the display was reported justified.

At Savannah, Georgia, on the 9th, the wind reached a velocity of 26 miles an hour from the northeast, the barometer remaining steady at 29.99; on the 10th the wind backed from n. to nw. and reached a velocity of thirty miles an hour; the lowest reported barometer was 29.82, on the afternoon of the 11th. At Charleston, South Carolina, high winds continued throughout the 10th, the barometer falling gradually, with rain during the afternoon; on the 11th the wind changed to w. and nw., brisk; barometer rising; the maximum velocity was 31 miles, n.; lowest barometer, 29.66.

The heaviest gales were experienced at stations north of the centre. On the 10th the wind reached a velocity of 60 miles ne., at Fort Macon, North Carolina, with heavy rain at intervals during the day. On the early morning of the 11th the wind shifted to se. and continued to blow with great force; at 7 a. m. the barometer read 29.70, and fell slowly until 4 p. m. of that date, after which a slight rise occurred and the wind afterwards shifted to sw., the gale ending on the 12th.

At Cape Lookout, North Carolina, the gale began on the morning of the 9th, the wind blowing from ne., gradually increasing in force and accompanied by heavy rain at intervals. By the morning of the 10th the wind had attained a velocity of about sixty miles an hour; low nimbus clouds moved from ne., and a very high ene. swell broke on the beach. From 12 m. till 8.30 p. m. the wind blew with an estimated velocity of 75 miles an hour; it then began to lull, and at intervals it rose in sudden gusts of terrific velocity, accompanied by sheets of salt water and sand and very heavy rain, which continued during the night. The wind remained at ne. until 1 a. m. of the 11th, when it shifted to se. and blew with great force throughout the day, accompanied by heavy rain. The rain was reported to have been the heaviest known at this station in many years. During the night of the 11–12th, the wind shifted to sw. and moderated. No damage was done at this place, as, owing to the timely warning issued from this office, all fishing property had been moved to places of safety.

At Portsmouth, North Carolina, the gale was equally severe; the wind reached a velocity of 62 miles, ne. on the 10th, shifting to se. and e. gales on the 11th; the high tide and heavy surf submerged the island to a depth of one foot. One vessel was driven ashore at Ocracoke inlet. The observers at coast stations reported much wreckage drifting along the shores. At Hatteras the lowest reported barometer during the gale was 29.73.

At Wilmington, North Carolina, the ne. gale began at 3 p. m. of the 10th, reaching a velocity of 32 miles an hour, barometer falling. On the 11th the barometer read 29.41 and the wind changed to se. and attained a velocity of 39 miles an hour. Telegraph and telephone wires were prostrated and one or two buildings of light construction were blown down; on the river several vessels were driven from their moorings, but received only slight damage. The land on the western side of the river was flooded by the immense body of water which was driven up the river by the gale.

The hurricane was most severe at Smithville, North Carolina, and appears to have lost its energy on reaching the land. The shifting of the wind indicates that the centre passed to the westward of the station, but the barometric gradient decreased so rapidly that the subsequent path of the disturbance became doubtful and cannot be traced. The observer at Smithville reports that many fences and buildings of light construction were destroyed, several houses unroofed, and trees uprooted. The leaves remaining on the trees after the gale, had the appearance of having been frostbitten, turning black and beginning to wither. The rain had a saltish taste from admixture of spray carried up and borne along by the violence of the wind. Many vessels broke from their moorings and drove ashore, sustaining more or less damage. The damage by the hurricane at Smithville was estimated at from $8,000 to $10,000.

After the 10th, 11th, and 12th the winds remained high over the ocean from W. 75° eastward to the sixtieth meridian, but the pressure increased to 30.0 and above.

Captain Powell, of the bark "Aquidneck," in a report of heavy ne. to se. gales encountered by him during the 9th, 10th, and 11th, when off Hatteras, says: "My barometer never fell below 30.0, nor rose above 30.2, the average was 30.1; for such a gale as this I never saw the barometer so high."

After this storm reached Wilmington, North Carolina, a slight depression developed in the southern portion of the middle Atlantic states on the 11th, and moved northward to western New York. This movement was traced by the wind directions at neighboring stations, the difference of barometric pressure being much less than one-tenth of an inch.

The following warnings in connection with this hurricane were issued by the Chief Signal Officer: At midnight of September 6th coast stations from Delaware Breakwater to Pensacola were warned of the approach of a cyclone, and vessels advised not to sail until further notice:

"Special bulletin, September 7th. 1 a. m.—A hurricane is reported in the West Indies near Porto Rico, moving slowly to the northward."

"Special bulletin, September 7th, 10 a. m.—Reports from the West Indies indicate that a hurricane is moving towards Florida from southeast of Jamaica, and vessels should not sail southward until the track of this storm is more fully determined."

September 7th.—Despatch sent to the "Maritime Exchange," New York: "Hurricane reported from the West Indies near Jamaica. Direction of movement cannot now be determined. Further information will be sent you when received."

"Special bulletin, September 8th, 10 a. m.—Reports from Florida indicate that a severe storm is moving slowly northwestward from the West Indies."

"September 8th.—To observer, New York: Reports from Florida indicate that a hurricane is moving northwestward from the West Indies."

"Special bulletin, September 10th, 1 a. m.—A severe storm is apparently moving northeastward from the West Indies, and it is now central off the south Atlantic coast."

"Special bulletin, September 10th, 10 a. m.—The indications are that the severe storm, which is central off the coast of Florida, will move northeastward during Monday and Tuesday, causing dangerous gales off the southern Atlantic, middle Atlantic, and southern New England coasts. Shipmasters are warned that it is not safe for vessels to leave port."

"Special bulletin, September 11th, 1 a. m.—The hurricane previously reported in the West Indies is moving northward along the Atlantic coast and is now central near Cape Hatteras. Dangerous gales are anticipated off the middle Atlantic and New England coasts on Tuesday and Wednesday. Vessels should not leave port."

"Special bulletin, September 11th, 10 a. m.—The West Indian hurricane has moved northward and is now clearly defined as central on the south Atlantic coast near Wilmington, North Carolina. Violent gales are reported this morning from the middle Atlantic and south Atlantic coasts, with heavy rains on the coast. Dangerous gales are indicated for the New England and middle Atlantic coasts during Tuesday and Wednesday. Vessels should not leave port, as the storm will be unusually severe north of Hatteras, North Carolina."

V.—This was a disturbance of considerable energy central northwest of Manitoba on the 12th, where the barometer fell below 29.5, attended by brisk and high winds. It apparently moved southeastward during the 12th, and finally disappeared to the north of Lake Superior on the 13th, without causing any marked change in the atmospheric conditions within the United States.

VI.—On the morning of the 15th the barometer was low north of Minnesota, and the succeeding report of that date indicated the presence of a low area north of the upper lake region. On the 16th this storm approached the lower lake region from the northwest, causing general rains as far to the

southward as the Gulf states. The advance of the high area to the west caused the depression to become greatly extended to the southwest over the Ohio valley and the sudden fall of temperature, due to the northwest winds, was attended by heavy rains in the Ohio valley and lake region. As in the preceding area described, this storm passed to the northeast and disappeared after apparently losing the greater portion of its energy.

VII.—On the morning of the 20th an area of high barometer was central in the upper Saint Lawrence valley, and a second high area was approaching from the extreme northwest, while the barometer was relatively low in the Mississippi valley. The high area to the east of this depression disappeared during the afternoon, but by midnight of that date the pressure had increased from two to four-tenths of an inch at stations on the eastern Rocky mountain slope as far south as Texas, the barometer remaining high and above 30.6 in the upper Missouri valley. The extended trough of low barometer was succeeded by a well-defined low-area, central near Milwaukee, Wisconsin, at 11 p. m., of the 20th, attended by rain in the upper lake region, and generally fair weather and cold northwest winds at the stations west of the Mississippi river. During the 21st this storm-centre moved first to the northwest toward Saint Paul, Minnesota, where it was central at 7 a. m., and afterwards to the southward over Iowa and Missouri, causing rain in the northwest and north of the Ohio valley, followed by gradually clearing weather in these sections on the 22d. The westerly and southerly movements of the depression delayed the advance of the cold wave in the northwest, and the frost warnings issued from this office were only verified at stations west of the Mississippi and in Wisconsin on the dates designated in the warning, but the frosts which occurred two days later in the states north of the Ohio river were caused by the cold wave which followed the disappearance of area number vii. Chart v. of this REVIEW shows the limits within which frosts were reported on the dates for which they were predicted. Reports show that these warnings were verified over the greater portion of the section named, and that frosts actually occurred within a few miles of Chicago, Illinois, and thence southward to Memphis, Tennessee.

VII *a*.—During the 19th, while number vii. was developing in the upper lake region, a second low area appeared north of Manitoba. This disturbance apparently moved southeastward until the afternoon report of the 20th, after which it probably formed a part of the low area previously described as vii.

VIII.—This area was central in Iowa on the 23d, being well-defined at the morning report of that date, and attended by local rains in the northwest and lake region. It moved directly eastward during the 23d, causing general rains in all districts, increasing in energy as it passed over the lake region. The barometer fell at stations near the centre, and by midnight of the 24th the centre of the disturbance was north of Lake Ontario, where the pressure was 29.06. This storm became unusually violent as it passed northeastward over the Saint Lawrence valley, and dangerous gales and heavy rains occurred at the Canadian stations, in the lower lake region, and off the New England coast. On the morning of the 25th the centre was near Farther Point, where the barometer had fallen to 28.8. The afternoon report of the same date showed that the centre of disturbance had passed to the east of Farther Point, but the barometer had fallen to 28.71 at this station, with a wind velocity of forty-seven miles per hour from the west. This storm disappeared to the east of the maritime stations on the 26th.

IX.—Low area ix. approached from Colorado on the 28th, where it was central at midnight of that date as a slight disturbance. It moved directly eastward during the 29th and 30th over the Ohio valley, causing but a slight disturbance at the central stations. It was at no time well defined as a low area but as an extended trough of low pressure moving slowly eastward, attended by variable winds and light rains. Cold northerly winds prevailed at the northern stations at the close of the month, and the reports received at 11 p. m. of the 30th indicate that this depression passed off the middle Atlantic coast with increasing energy.

NORTH ATLANTIC STORMS DURING SEPTEMBER, 1883.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during September, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to October 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. p. m., Greenwich mean time.

Five depressions are charted for the month of September, 1883. Of these, two are traced from the coast of the North American continent eastward to Europe; and one is a continuation of a disturbance traced from the United States to mid-ocean at the close of August. The remaining depressions, numbers ii. and v., either dissipated or moved northward beyond the limits of observation. It is more probable, however, that they took the latter course, since scattering vessel-reports at hand indicate the presence of depressions north of the fifty-fifth parallel, passing far to the north of the British Isles. The depressions numbered iii. and iv. appear to have moved somewhat south of the usual track. The violent West India hurricane which prevailed during first decade of the month is traced on chart i., and is fully described in this REVIEW as number iv., under the heading "Areas of low barometer." The following descriptions refer to the depressions traced on chart ii.:

I.—This was a continuation of the tropical hurricane described as number viii. in the REVIEW for August. It moved over the Banks of Newfoundland as a storm of great energy, and at the close of August it was central near N. 52°, W. 35°. Moving eastward, or slightly south of east, with undiminished energy during that day, it reached N. 50°, W. 15°, on the 1st. The following report, furnished by Captain Bussius, of the s. s. "Neckar," is given as indicating the approximate vicinity of the storm-centre and its violence:

Date.	Time.	Position.		Barometer (corrected).		Wind.		Remarks.
		Lat. N.	Long. W.	Inches.	Mill.	Direction.	Force.	
		° ′	° ′					
Aug. 31	noon	Off	Lizard	29.75	755.6	ne.	2–3	Almost calm at times.
Do	4 p. m	.....	.....	29.75	755.6	sw.	2	Smooth sea.
Do	8 p. m	49 44	8 00	29.74	755.4	wsw.	2	Light westerly swell.
Do	12 p. m	49 54	9 16	29.70	754.4	w.	3	Wind backing.
Do	16 p. m	50 04	10 32	29.42	747.3	s.	5	Do.
Do	20 p. m	50 23	11 20	29.81	731.8	se.	9	Rain; heavy showers.
Sept. 1	noon	50 30	12 35	28.43	722.1	ese.	7–6	Rain and confused sea.
Do	1 p. m	.....	.....	28.36	720.3	.....	.....	Lowest reading.
Do	4 p. m	50 30	13 44	28.52	724.4	nne.	8	Rain and confused sea.
Do	6 p. m	50 30	14 13	28.67	728.2	n.	9	Increasing wind and sea. At 6.30 p. m. wind nnw., was blowing a hurricane; ship hove to.
Do	8 p. m	50 29	14 22	28.84	732.5	nnw.	.....	Wind blowing a hurricane; ship hove to.
Do	12 p. m	50 28	14 41	28.98	732.1	nnw.	10	Slightly clearing.
Do	16 p. m	50 27	15 05	29.27	743.4	nnw.	9	Do.
Do	20 p. m	50 27	15 30	29.46	748.3	nnw.	9	Sky breaking.
Sept. 2	noon	50 28	16 10	29.60	751.8	nnw.	8	Sea decreasing; weather moderately fine and the sky cleared.

Captain Heeley, of the s. s. "England," reports as follows: "September 1st, 3 a. m., Greenwich mean time, barometer 28.4 (721.3), light variable winds veering between ese. and nne., with very heavy sw. sea. 5 a. m., barometer 28.37 (720.6), very threatening appearance to the northeastward. 5.30 a. m., gale struck us from nne., rapidly increasing to hurricane force, with very heavy confused sea and heavy rain; ship enveloped in spray and impossible to see a ship's length. Kept ship away to the southward; the barometer began to rise rapidly. 7 a.

m., 28.65 (727.7); 9 a. m., 28.85 (732.8); 11 a. m., 29.15 (740.4). Gale moderating. Rounded ship to, with head to nw.; 1 p. m., strong gale with furious squalls and heavy cross sea; ship laboring heavily; barometer 29.25 (742.9). Midnight, wind and sea moderating; barometer, 29.62 (752.3). The ship's position, at the time the gale struck us, was N. 50° 45′, W. 18° 15′."

The steamers "Westphalia," "Bohemia," "British Crown," "Samaria," and others between N. 50° and 52° and W. 15° and 20°, all reported a barometric pressure of less than 28.4 (721.3), with terrific gales from ssw. to nnw. The gale extended to the English Channel and over the Bay of Biscay, and caused numerous shipping disasters. On the 2d the centre of disturbance moved over the British Isles, causing heavy gales and much damage in those islands, the North sea, and along the coast of northwestern Europe.

II.—This was probably a continuation of the depression charted as low area iii. of chart i. It passed over the Gulf of Saint Lawrence during the 9th, and was central north of the Banks of Newfoundland on the 10th; on the Banks the brig "Marietta" on that day had a heavy gale, and split and lost sails. The disturbance apparently moved northeastward with decreasing pressure, and on the 11th it was near N. 55°, W. 33°.

The s. s. "Polynesian" reported as follows: "September 10th, 8 p. m., Greenwich mean time, wind increasing and sea rising, dirty appearance, barometer 29.81 (757.2), falling rapidly, wind sw. Midnight, barometer 29.35 (745.5), wind increasing to a heavy gale with high cross sea. At 4 a. m. of the 11th, barometer 29.07 (738.4), increasing sse. gale with high dangerous sea from sw.; 6.15 a. m., barometer 28.67 (728.2), wind sw., shifting suddenly to wnw., violent gales with terrific squalls; 8 a. m., gale continues, with hail-squalls and high westerly sea. Noon, (about N. 56° 17′, W. 34° 4′) gale continues with hail-squalls, barometer 29.12 (739.6); midnight, barometer 29.47 (748.5), gale continued until 8 a. m. of the 12th, when it began to moderate, wind w."

During the 11th the disturbance probably passed northward beyond the sixtieth parallel.

III.—This disturbance was first observed on the banks of Newfoundland on the 14th. The s. s. "Lord Gough," in N. 50° 2′, W. 42° 00′, reported barometer 29.69 (754.1), a fall of .13 inch during the preceding twenty-four hours, wind backing to wsw., showery; while the s. s. "Polynesian," to the northwest of the centre, in N. 53° 5′, W. 50° 4′, reported barometer 29.67 (753.6), wind hauling to e., through s., and into ne., gentle. During the day the disturbance moved by a course somewhat south of east, and by the 15th the centre had reached N. 49°, W. 37°, where the barometer read 29.5 (749.3). Moving slowly east-southeastward, the storm-centre was shown near N. 48°, W. 30°, on the 16th. The following reports indicate the proximity of the centre:

Captain Cochrane, of the s. s. "The Queen," reported: "At 2 p. m. of September 15th, the barometer began to fall, with increasing wind from sse., and rain; at 11 p. m., wind hauled to ssw., then backed again to sse., and by 6 a. m. of the 16th, it had backed to se. by e. At 11 a. m., (about N. 49° 30′, W. 29° 50′) it had hauled again to ssw., the barometer falling steadily; by 2 p. m. it had backed to se., and round by e. to ne. at 6 p. m., when the barometer was at its lowest and read (mercurial) 29.12 (739.6), (aneroid) 28.82 (732.0). The wind still backed round till it reached nnw., blowing a fresh gale with a very heavy and confused sea. By midnight of the 17th the wind and sea had moderated very much. As the wind backed to the northward of east, the barometer commenced to rise rapidly."

Captain Willigerod, of the s. s. "Elbe," reported: "On September 16th a depression was observed near N. 50°, W. 29°; fresh gale from se., with thick and misty weather and falling barometer until 9 p. m., when the wind hauled to e. and ne.; lowest barometer, 28.98 (736.1). After that time the wind shifted to nw., fresh gale, rising barometer, and clearing weather. Had high confused sea all the time; ship labored heavily."

Captain Pearce, of the s. s. "Greece" in about N. 48° 40′, W. 25°, reported: "September 16th, 7.15 p. m., (N. 48° 50′, W. 23° 50′) barometer 29.2 (741.7), the wind, which had previously hauled from se. to sse. during the afternoon and moderated from strong to fresh gale, now commenced to blow with increased force. Midnight, heavy gale from w. by s.; barometer, 29.0 (736.6), passing showers of rain. September 17th, 4. a. m., gale continues to blow from w. by s. with decreasing force, barometer rising."

Captain Hellmers, of the s. s. "Habsburg," reported: "16th, in N. 49° 40′, and between W. 26° 50′, and 26° 15′, strong gale from se., which lasted four hours, lowest barometer 29.19 (741.4)."

The s. s. "Dominion," in N. 55°, W. 38°, reported long se. swell running against a northwest wind, cloudy hazy weather. During the 16th the course appears to have changed to the northeastward, and on the 17th the disturbance was shown near N. 51°, W. 27°. The s. s. "Nessmore," in N. 50° 44′, W. 28° 04′, reported barometer 28.82 (732.0), wind w., force 7; and the s. s. "Arizona," in N. 51° 10′, W. 26° 26′, barometer 29.06 (738.1), wind sw., force 6, showery. The storm-centre moved very slowly in an easterly direction; the vessel reports of the 18th and 19th show that s. winds prevailed from W. 25° eastward to W. 15°, while w. and nw. winds prevailed to the west of the first mentioned meridian; the barometer over this region read 29.6 (751.8). By the 20th the disturbance was central north of N. 50°, and near W. 17°. During the day it appears to have passed slightly south of Ireland and over the English Channel.

IV.—This is probably a continuation of the depression charted as vi. of chart i. It passed over the Gulf of Saint Lawrence and the Maritime Provinces during the 17th, and, on the 18th, it was shown on the Banks; vessels in that neighborhood reporting a decrease of pressure amounting to about .15 inch, wind shifting to south. It moved slowly eastward during the 18th and 19th, the pressure gradually decreasing, and, on the 20th, was central near N. 45°, W. 42°; the s. s. "Samaria," in N. 45° 25′, W. 42° 25′, reports barometer 28.95 (735.3), wind e., force 5; and the s. s. "Archimedes," in N. 43° 21′, W. 45° 17′, barometer 29.25 (742.9), wind wnw., force 7-8. Captain Pearce, of the s. s. "Greece," reported, 20th, a. m., wind se., rain; 4.30 a. m., after about four hours rain the wind shifted suddenly from se. to nne. and blew a strong gale, barometer 29.24 (742.7); 8 a. m., strong nne. gale, with rain. At noon the wind backed suddenly to nw., and blew with the force of a heavy gale; 4 p. m., barometer began to rise; 5 p. m., less rain, clouds breaking in the west and gale moderating; the ship's position was N. 44° 27′, W. 43° 45′.

Captain Meyer, of the s. s. "Ohio," furnishes the following report:

Date.	Time.	Barometer (corrected.)		Wind.	
		Inches.	Mill.	Direction.	Force.
September 20	3 a. m.	29.34	745.2	nnw.	6-7
Do	7 a. m.	29.32	744.7	nne.	7
Do	11 a. m.	29.21	741.9	n.	7
Do	3 p. m.	28.74	730.0	nnw.	7-10
Do	4 p. m.	28.74	730.0	nnw.	10-5
Do	7 p. m.	28.90	734.0	ene.	7-6

The wind reached its greatest force at 3 p. m., after which the wind and sea decreased rapidly; ship's position, N. 45° 7′, W. 44° 45′. During the 21st the pressure remained unchanged, and stormy weather continued as the disturbance moved slowly eastward. On the 22d, the storm-centre, having moved northeastward, was shown near N. 49°, W. 32° in which region the barometer read 28.9 (734.0), with n. to nw. winds and rain-squalls. On the 23d the storm-centre was well defined near N. 51°, W. 25°, barometer 28.9 (734.0) with moderate s. gales to the eastward, and w. and nw. gales to the westward of the centre. Continuing its northeasterly movement during the day, the storm-centre reached N. 55°, W. 18°, on the 14th; the

barometer near the centre reading 29.0 (736.0). Strong sw. gales were now reported by vessels between the fiftieth and fifty-third meridian and off the southwest coast of Ireland. On the 25th the depression was northwest of Ireland, and moving northeastward.

V.—This was probably a continuation of low area viii. of chart i. It passed over the maritime provinces of Canada and the gulf of Saint Lawrence as a severe gale on the 25th; and on the following day it was probably central in or near Newfoundland, vessels on the Banks reporting a pressure of 29.6 (751.8), moderate sw. gales. On the 27th the barometric pressure over the ocean between N. 49° and 55° and W. 35° and 40°, was 29.6 (751.8), wind sw.; and on the following day the disturbance disappeared, the pressure over the above-mentioned region having increased to 30.1 (764.5) and above.

OCEAN ICE.

The small number of vessels reporting icebergs in the North Atlantic ice region, indicates that the danger attending vessels bound to and from Europe, through the proximity of icebergs, is now comparatively small; the line showing the limits of icebergs, on chart ii., is therefore discontinued.

The following are the only icebergs reported to have been observed during the month:

The s. s. "State of Indiana," at noon of the 1st, in N. 48° 25′, W. 47° 10′, saw a large iceberg.

The s. s. "Grecian," on the 7th, in N. 53° 23′, W. 49° 20′, passed two icebergs.

The s. s. "Nederland," on the 10th, in N. 49° 01′, W. 44° 33′ passed an iceberg.

The s. s. "Thingvalla," on the 30th, in N. 49° 35′, W. 47° 53′, passed an iceberg one hundred and fifty feet high.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada, for the month of September, 1883, is exhibited on chart iii., by the dotted isothermal lines.

In the first column of the following table are shown the normal temperatures of September in the several districts, as determined from the Signal Service records; the second column shows the mean temperature of September, 1883, and the third column shows the departures of September, 1883, from the normal:

Average Temperatures for September, 1883.

Districts.	Average for September, Signal-Service observations.		Comparison of Sept., 1883, with the average for several years.
	For several years.	For 1883.	
	°	°	°
New England	62.2	59.8	2.4 below.
Middle Atlantic states	68.2	65.8	2.4 below.
South Atlantic states	74.3	72.8	1.5 below.
Florida peninsula	80.1	79.7	0.4 below.
Eastern Gulf	74.8	75.2	0.4 above.
Western Gulf	76.0	75.4	0.6 below.
Rio Grande valley	80.5	78.8	1.7 below.
Tennessee	70.1	69.7	0.4 below.
Ohio valley	67.7	65.8	1.9 below.
Lower lakes	62.7	58.2	4.5 below.
Upper lakes	59.0	55.3	3.7 below.
Extreme northwest	54.7	53.7	1.0 below.
Upper Mississippi valley	64.8	61.6	3.2 below.
Missouri valley	63.6	60.4	3.2 below.
Northern slope	56.7	56.4	0.3 below.
Middle slope	63.9	63.9	normal.
Northern plateau	59.8	59.8	normal.
Southern plateau	72.2	72.4	0.2 above.
North Pacific	58.9	59.4	0.5 above.
Middle Pacific	68.0	69.7	1.7 above.
South Pacific	72.8	75.8	3.0 above.
Mount Washington, N. H	40.9	38.9	2.0 below.
Pike's Peak, Colo	31.3	30.2	1.1 below.
Salt Lake City, Utah	64.4	69.3	4.9 above.

The mean temperature of September, 1883, has been above the normal in California, Nevada, Utah, and Arizona, and in the eastern Gulf states, the departures being greatest in southern California and at Salt Lake City, Utah, where they are 3° and 4°.9 respectively. In the eastern Gulf states the mean temperature exceeds the normal by only 0°.4, and in the northern plateau, north Pacific coast region, and middle slope it has not differed from the September normal. Over the country east of the Rocky mountains, with the exception of the east Gulf states and middle slope, the mean temperature has been below the normal. The departures are less than 1° in the northern slope, Tennessee, Florida, and in the west Gulf states, while in the upper Mississippi and Missouri valleys, and in the lake region, the departures below the normal temperature have varied from 3°.2 in the two first named districts to 4°.5 in the lower lake region. On the Atlantic coast the mean temperature has averaged from 1°.5 below the normal in the south Atlantic states, to 2°.4 below in the New England and the Middle Atlantic states.

The general distribution of mean temperature, with the districts of maximum departures from the normal, for the month of September in each year from 1873 to 1882, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
	°		
Western Gulf	+ 0.6	1873	Normal in New England, the south Atlantic states, Tennessee, and the Ohio valley; slightly above the normal in the lower lake region, middle Atlantic, and Gulf states; below the normal in the upper lake region, Minnesota, and in the upper Mississippi and Missouri valleys.
Middle Atlantic states	+ 0.5		
Minnesota	− 2.5		
Upper Mississippi valley	− 2.0		
Missouri valley	− 1.5		
Upper lakes	+ 5.7	1874	Normal in the south Atlantic states; below the normal in the lower Missouri valley and on the Pacific coast; above the normal in the Southern states and in the northern districts east of the Missouri valley.
Lower lakes	+ 4.7		
Ohio valley and Tennessee	+ 3.1		
Lower Missouri valley	− 2.5		
Pacific coast	− 1.2		
Saint Lawrence valley	− 4.0	1875	Below the normal over the entire country, the departures being least marked in the Missouri valley and on the Pacific coast.
Gulf states	− 2.7		
New England	− 2.5		
South Atlantic states	− 1.8		
South Atlantic states	+ 0.2	1876	Slightly above the normal in the south Atlantic states; normal in the middle Atlantic states; below the normal in all other parts of the country.
Saint Lawrence valley	− 2.0		
Lower Missouri valley	− 1.8		
Lower lakes	− 1.6		
New England	− 1.5		
Upper Missouri valley	+ 5.9	1877	Normal at the Rocky mountain stations; above the normal in all other parts of the country, the departures being least marked on the Pacific coast and in the Ohio valley and Gulf states.
Upper Mississippi valley	+ 4.6		
Upper lakes	+ 4.2		
New England	+ 3.7		
Upper lakes	+ 3.6	1878	Normal in the upper Missouri valley; slightly below the normal on the Pacific coast and in Minnesota; above the normal in all other districts.
Lower lakes	+ 3.2		
Middle Atlantic States	+ 3.2		
Pacific coast	− 0.6		
Minnesota	− 0.2		
Boisé City, Idaho	+ 0.8	1879	Above the normal at the Rocky mountain stations and in the west Gulf states; below the normal in the Rio Grande and Missouri valleys, Minnesota, and in all districts east of the Mississippi river, except normal at the Canadian maritime stations.
Pike's Peak, Colo	+ 5.0		
Northern slope	+ 4.8		
Lower lakes	− 2.9		
Rio Grande valley	− 2.7		
Saint Lawrence valley	− 2.6		
Canadian maritime stations	+ 1.9	1880	Above the normal in the northern plateau, northern slope, middle Atlantic states, and from the lake region to the Canadian Maritime Provinces; below the normal in all other parts of the country.
New England	+ 1.8		
Middle Atlantic states	+ 1.4		
Southern slope	− 2.3		
Western Gulf	− 1.8		
Eastern Gulf	− 1.6		
Lower lakes	+ 8.9	1881	Normal in the Rio Grande valley; below the normal in Minnesota, the Missouri valley, northern slope, and west of the Rocky mountains, except slightly above in southern California; above the normal in all other districts, the departures being exceptionally large in the lower lake region, middle Atlantic states, and Ohio valley.
Middle Atlantic states	+ 8.2		
Ohio valley	+ 7.5		
Northern plateau	− 5.1		
Salt Lake City	− 4.4		
Southern plateau	− 3.5		
Extreme northwest	+ 3.3	1882	Normal in the Ohio valley and south Atlantic states; below the normal on the Pacific coast and over the southern portions of the country; above the normal in the lower Missouri valley and over the northern districts from the Rocky mountains to the Atlantic coast.
Northern plateau	+ 2.2		
Middle Atlantic states	+ 1.6		
Southern slope	− 6.3		
Rio Grande valley	− 3.3		
Southern plateau	− 2.8		

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations during the month:

Stations reporting highest.	°	Stations reporting lowest.	°
Yuma, Arizona	85.7	Pike's Peak, Colorado	30.2
Key West, Florida	82.9	Mount Washington, New Hampshire	38.9
Rio Grande City, Texas	79.8	Saint Vincent, Minnesota	50.7
Cedar Keys, Florida	79.7	Alpena, Michigan	52.8
New Orleans, Louisiana	79.4	Fort Maginnis, Montana	53.1
Galveston, Texas	79.3	Escanaba, Michigan	53.3
Indianola, Texas	78.2	Fort Buford, Dakota	53.5
Brownsville, Texas	77.7	Fort Shaw, Montana	53.9
Mobile, Alabama	77.7	Marquette, Michigan	53.9
Sanford, Florida	77.5	Fort Assiniboine, Montana	54.2
Pensacola, Florida	77.2	Mackinaw City, Michigan	54.2

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average temperatures for September, 1883. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: mean temperature, 67°.5, is 5° below the September average of the two preceding years.

California.—Poway, San Diego county: mean temperature, 70°.6, is 3°.3 above the September average of five years, and is the highest September mean of that period.

Illinois.—Riley, McHenry county: mean temperature, 56°.8, is 3°.2 below the September average of twenty-two years.

Anna, Union county: mean temperature, 68°.6, is about the September normal for the last eight years.

Indiana.—Wabash, Wabash county: mean temperature, 58°.3, is 4°.6 below the September average of eight years.

Logansport, Cass county: mean temperature, 61°.5, is 4° below the September average of the last twenty-four years.

Vevay, Switzerland county: mean temperature, 68°, is 0°.6 below the September average of fifteen years.

Kansas.—Yates Centre, Woodson county: mean temperature, 64°, is 3°.8 below the September average of the three preceding years.

Lawrence, Douglas county: mean temperature, 63°5, is 2°.8 below the September average of the last sixteen years.

Wellington, Sumner county: mean temperature, 63°.8, is 5°.1 below the September average of five years.

Maine.—Gardiner, Kennebec county: mean temperature, 56°.1, is 2°.6 below the September average of a period of forty-seven years.

Maryland.—Fallston, Harford county: mean temperature, 62°.8, is 2°.1 below the September average of twelve years. The highest September mean of that period, 67°.9, occurred in 1874; the lowest, 61°.3, occurred in 1871.

Sandy Springs, Montgomery county: mean temperature, 62°.6, is 3° below the September normal.

New York.—North Volney, Oswego county: mean temperature, 56°.7, is 4° below the average of sixteen years.

Palermo, Oswego county: mean temperature, 54°.5, is 6°.3 below the September average of thirty years.

Ohio.—Cleveland: mean temperature, 59°.0, is 4°.5 below the September average of a period of thirty years.

Wauseon, Fulton county: mean temperature, 57°.2, is 5°.8 below the September average of thirteen years. During that period the highest September mean, 71°.2, occurred in 1881; the lowest is that for September, 1883.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 55°.3, is 4° above the September average of seventeen years. The highest September mean of that period, 66°.9, occurred in 1881; the lowest, 52°.5, occurred in 1871.

Wellsborough, Tioga county: mean temperature, 52°.3, is several degrees below the September average of the last fifteen years.

Texas.—New Ulm, Austin county: mean temperature, 76°.4, is 1°.3 below the September average of the last twelve years. The highest September mean of that period, 81°.1, occurred in 1872; the lowest, 75°.6, occurred in 1876.

Vermont.—Woodstock, Windsor county: mean temperature, 55°.3, is 1°.2 below the September average of the last sixteen years. The extreme monthly means for the same period are: highest, 62°.6 in 1881; lowest, 49°.0 in 1871.

Virginia.—Variety Mills, Nelson county: mean temperature, 63°.8, is 3°.7 below the September average of the last six years.

West Virginia.—Helvetia, Randolph county: mean temperature, 61°.8, is 0°.4 above the September average of seven years.

Table of Maximum and Minimum Temperatures for September, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Montgomery	96	53	Mt. Vernon Barracks	96	53
Do				State Line	93	64
Arizona	Yuma	111	63	Texas Hill	118	60
Do	Prescott	95	30	Fort Bowie	94	47
Arkansas	Fort Smith	98	40	Lead Hill	95	36
Do				Mount Ida	94	32
California	Los Angeles	104	53	Mammoth Tank	122	72
Do	Cape Mendocino	90	46	Summit	72	32
Colorado	West Las Animas	98	35	Fort Collins	95	33
Do	Pike's Peak	49	7	Fort Garland	81	23
Connecticut	New Haven	79	38	Southington	84	32
Dakota	Fort Sully	99	28	Fort Sully	99	39
Do	Bismarck	92	16	Fort Pembina	86	11
Delaware	Del. Breakwater	79	53			
District of Columbia	Washington	87	44	Receiving Reservoir	87	48
Florida	Pensacola	93	60	Mayport	92	59
Do	Key West	92	72	Limona	96	68
Georgia	Augusta	94	56	Forsyth	96	60
Do	Atlanta	90	52	Madison	88	52
Idaho	Fort Lapwai	102	31	Fort Lapwai	98	32
Do	Cœur d'Alene	83	30			
Illinois	Cairo	89	47	Bunker Hill	96	39
Do	Springfield	88	39	Polo	85	31
Indiana	Indianapolis	87	40	Laconia	92	42
Do				Griffin Station	85	29
Indian Territory	Fort Reno	98	40			
Iowa	Des Moines	90	37	Logan	93	42
Do	Dubuque	84	34	Humboldt	92	30
Kansas	Leavenworth	92	42	Manhattan	100	42
Do				Emporia	92	32
Kentucky	Louisville	92	44	Bowling Green	93	50
Do				Frankfort	89	39
Louisiana	New Orleans	90	63	Point Pleasant	100	54
Maine	Portland	78	43	Cornish	81	38
Do	Eastport	75	40	Orono	80	33
Maryland	Baltimore	81	46	Sandy Springs	85	40
Massachusetts	Boston	79	41	Somerset	87	38
Do	Provincetown	78	40	Heath	80	28
Michigan	Port Huron	83	36	Grand Rapids	90	31
Do	Escanaba	73	26	Fort Brady	72	25
Minnesota	Saint Vincent	89	17	Minneapolis	84	29
Do	Saint Paul	84	30	Fort Snelling	85	22
Mississippi	Vicksburg	95	54			
Missouri	Saint Louis	92	43	Bolivar	98	42
Do				Pierce City	93	38
Montana	Fort Benton	84	30	Fort Keogh	94	43
Do	Fort Shaw	83	27			
Nebraska	North Platte	91	30	Lincoln	95	24
Do				Fort Niobrara	92	30
Nevada				Halleck	100	26
New Hampshire	Mount Washington	50	15	Grafton	80	30
New Jersey	Little Egg Harbor	86	47	Moorestown	87	38
Do	Cape May	80	44	Freehold	83	37
New Mexico				Fort Union	86	27
New York	Oswego	81	40	West Point	87	33
Do	Buffalo	80	36	Johnstown	79	20
North Carolina	Charlotte	92	51	Chapel Hill	94	49
Do	New River Inlet	93	58	Highlands	83	37
Ohio	Columbus	88	39	Cincinnati	93	44
Do	Toledo	82	37	Wauseon	89	29
Oregon	Portland	87	45	Fort Klamath	92	20
Do	Roseburg	80	39	Albany	90	46
Pennsylvania	Philadelphia	89	45	Chambersburg	85	39
Do	Erie	84	42	Wellsboro'	81	28
Rhode Island	Narragansett Pier	77	39			
South Carolina	Charleston	90	58	Statesburg	92	56
Tennessee	Knoxville	92	47	Howell	93	50
Do				Grand View	90	32
Texas	Rio Grande City	104	53	Barnesville	110	65
Do	Stockton	93	40	Cleburne	100	42
Utah	Salt Lake City	89	46	Corinne	100	55
Do				Nephi	85	30
Vermont				Woodstock	82	29
Virginia	Lynchburg	87	46	Accotink	87	45
Do	Fort Myer	84	43	Snowville	80	39
Washington	Dayton	91	30	Fort Spokane	88	30
West Virginia				Helvetia	83	34
Wisconsin	Milwaukee	83	39	Beloit	85	34
Do	La Crosse	79	35	Neillsville	82	24
Wyoming	Cheyenne	83	30	Fort Bridger	80	19

MONTHLY RANGES OF TEMPERATURE.

The monthly ranges of temperature have been greatest in southern California, Arizona, and over an extent of country reaching from central Texas to the northern boundary of the United States. They have been smallest on the Atlantic coast south of New Jersey, and at the stations on the coast of the Gulf of Mexico.

The following are the largest monthly ranges that have been reported: Bismarck, Dakota, 76°; Fort Buford, Dakota, 73°; Saint Vincent, Minnesota, 72°; Fort Lapwai, Idaho, 71°; Fort Sully, Dakota, 71°; Fort Bennett, Dakota, 68°; Fort Meade, Dakota, 63°; West Las Animas, Colorado, 62°; Dayton, Washington Territory, 61°; Huron, Dakota, 60°; Lewiston, Idaho, 60°; Fort Apache, Arizona, 59°; Phœnix, Arizona, 59°; San Carlos, Arizona, 59°; Fort Reno, Indian Territory, 58°; Fort Smith, Arkansas, 58°; Prescott, Arizona, 58; Fort Shaw, Montana, 56°; North Platte, Nebraska, 55°.

The smallest monthly ranges are: Key West, Florida, 20°; Hatteras, North Carolina, 22°; Fort Macon, North Carolina, 23°; Portsmouth, North Carolina, 24°; Sanford, Florida, 24°; Cedar Keys, Florida, 25°; Cape Henry, Virginia, 26°; Delaware Breakwater, Delaware, 26°; Galveston, Texas, 26°; El Paso, Texas, 28°; Kittyhawk, North Carolina, 28°; New Orleans, Louisiana, 28°; Smithville, North Carolina, 28°; Indianola, Texas, 29°; Savannah, Georgia, 29; Wash-Woods, North Carolina, 29°; Chincoteague, Virginia, 30°; Norfolk, Virginia, 30°; Ocean City, Maryland, 30°; Wilmington, North Carolina, 31°; Charleston, South Carolina, 32°; Provincetown, Massachusetts, 32°; Pensacola, Florida, 33°.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature have varied in the different districts as follows:

New England.—From 18° at Block Island, Rhode Island, on the 10th, to 30° at New Haven, Connecticut, on the 22d.

Middle Atlantic states.—From 17° at Delaware Breakwater, Delaware, on the 2d, 7th, and 27th, to 32° at Lynchburg, Virginia, on the 8th.

South Atlantic states.—From 16° at Fort Macon, North Carolina, on the 2d, and at Hatteras, North Carolina, on the 8th and 27th, to 27° at Augusta, Georgia, on the 1st.

Florida peninsula.—From 16° at Key West, on the 13th, to 24° at Sanford, on the 12th.

Eastern Gulf.—From 18° at New Orleans, Louisiana, on the 25th, to 29° at Montgomery, Alabama, on the 27th and 28th.

Western Gulf.—From 16° at Galveston, Texas, on the 25th, to 40° at Fort Smith, Arkansas, on the 11th.

Tennessee.—From 27° at Memphis, on the 1st, to 32° at Knoxville, on the 19th.

Ohio valley.—From 29° at Cincinnati, Ohio, on the 27th, to 31° at Columbus, Ohio, on the 11th, and at Indianapolis, Indiana, and Louisville, Kentucky, on the 12th.

Table of Comparatice Maximum Temperatures for the Month of September.

State or Territory.	Maximum for September, 1883, Signal Service.		Maximum since Signal-Service stations were opened—3 to 12 years.			Highest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
		°		°			°		
Alabama	Montgomery	96	Montgomery	97	'75,'77	Mount Vernon Arsenal	98		33 years.
Arizona	Yuma	111	Burke's and Yuma	113	1879	Fort McDowell	114	1879	14 "
Arkansas	Fort Smith	98	Little Rock	97	1881	Fort Smith	101		21 "
California	Los Angeles	104	Red Bluff	106	1877	Fort Miller	114		13 "
Colorado	West Las Animas	98	Denver	93	1878	Fort Lyon	99	1875	19 "
Do	Denver	88	West Las Animas	94	1882				
Connecticut	New Haven	79	New Haven	100	1881	Columbia	94		10 "
Do	New London	78	New London	92	1881	New Haven	92		87 "
Dakota	Fort Sully	99	Fort Sully	107	1874	Fort Randall	106		20 "
Do	Fort Bennett	95	Yankton	100	1881	Fort Sully	106	1874	14 "
Delaware	Delaware Breakwater	79	Delaware Breakwater	93	1881	Fort Delaware	90		44 "
District of Columbia	Washington	87	Washington	104	1881	Washington	95		58 "
Florida	Pensacola	93	Jacksonville	98	1875	Fort Jefferson	100	1871	12 "
Georgia	Augusta	94	Augusta	97	'75, '81	Oglethorpe Barracks	99		36 "
Idaho	Fort Lapwai	102	Boise City	96	1878	Fort Boisé	103	1874	16 "
Illinois	Cairo	89	Cairo	97	1881	Manchester	102	1864	11 "
Do	Springfield	88	Chicago	94	1881	Anna	102	1881	7 "
Indiana	Indianapolis	87	Indianapolis	94.5	1881	Laconia	101	1881	7 "
Indian Territory	Fort Reno	98	Fort Gibson	104.5	1881	Fort Gibson	103		52 "
Iowa	Des Moines	90	Keokuk	97	1881	Muscatine	103	1881	7 "
Kansas	Leavenworth	92	Dodge City	99	'76'81'82	Fort Riley	108		24 "
Do			Leavenworth	101	1882	Clay Centre	109	1881	1 "
Kentucky	Louisville	92	Louisville	99	1881	Newport Barracks	96		28 "
Louisiana	New Orleans	90	Shreveport	101	1881	Fort Jesup	100		22 "
Do			New Orleans	59	'75'77'81	Point Pleasant	104	1881	7 "
Maine	Portland	78	Portland	94.5	1881	Brunswick	96		52 "
Maryland	Baltimore	81	Baltimore	101	1881	Fort Washington	99		37 "
Massachusetts	Boston	79	Boston	101.5	1881	Fort Warren	100	1872	18 "
Michigan	Port Huron	83	Detroit and Marquette	97	1874	Thornville	100	1881	-3 "
Do	Marquette	82	Port Huron	97	1881	Fort Brady	98	1854	57 "
Minnesota	Saint Vincent	89	Saint Paul	94	1878	Fort Snelling	92		60 "
Mississippi	Vicksburg	95	Vicksburg	98	1881	Fayette	98	1881	6 "
Missouri	Saint Louis	92	Saint Louis	101.5	1881	Saint Louis	101	1881	41 "
Montana	Fort Benton	84	Glendive	101	1882	Tongue River	103	1877	3 "
Do	Fort Shaw	83	Fort Keogh	99	1882	Fort Benton	101	1878	11 "
Nebraska	North Platte	91	North Platte	101	1881	Clear Creek	103	1881	7 "
Do			Omaha	99	1881	Genoa	103	1881	6 "
Nevada			Winnemucca	94	'78.'80	Fort McDermitt	96	'75,'79	15 "
New Hampshire	Mount Washington	60	Mount Washington	65	1880	Dartmouth College	92		17 "
Do						Auburn	95	1881	9 "
New Jersey	Little Egg Harbor	86	Sandy Hook	101	1881	Atco	104	1881	7 "
New Mexico			La Mesilla	105	1879	Fort Craig	103		26 "
New York	Oswego	81	New York City	100	1881	Poughkeepsie	100		30 "
Do	Buffalo	80	Rochester	98	1881	Pen Yan	102	1881	16 "
North Carolina	New River Inlet	93	Wilmington	95	'75,'76	Fort Johnson	98		54 "
Ohio	Columbus	88	Cleveland	98	1881	College Hill	102	1881	6 "
Do	Cincinnati	88	Columbus	98	1881	Cincinnati	99		35 "
Oregon	Portland	87	Umatilla	95	'77,'79,	Fort Haskins	98		9 "
Pennsylvania	Philadelphia	82	Philadelphia	101.5	1881	Milton	105	1881	3 "
Do	Erie	84	Pittsburg	101.6	1881	Fallsington	103	1881	3 "
Rhode Island	Narragansett Pier	77	Newport	88	1881	Fort Adams	96	1881	40 "
South Carolina	Charleston	90	Charleston	94	1876	Fort Moultrie	93		27 "
Do						Aiken	95	1881	3 "
Tennessee	Knoxville and Memphis	92	Memphis and Nashville	96	1881	Ashwood	100	1881	3 "
Texas	Rio Grande City	104	Rio Grande City	107	1877	Fort Stockton	109		21 "
Utah	Salt Lake City	89	Salt Lake City	93	1875	Fort Douglass	97	1876	19 "
Vermont			Burlington	90	'80,'81	Charlotte	94	1880	7 "
Virginia	Lynchburg	87	Fort Myer	102	1881	Accotink	104	1881	7 "
Washington	Dayton	91	Almota	94	1882	Fort Walla Walla	98		10 "
West Virginia			Morgantown	91	1881	Flemington	99	1881	5 "
Wisconsin	Milwaukee	83	Milwaukee	94	1874	Fort Howard	98		30 "
Do	La Crosse	79	La Crosse	92	1873	Edgerton	98	1881	1 "
Wyoming	Cheyenne	83	Fort Washakie	90	1882	Fort Laramie	99		26 "

Lower lakes.—From 24° at Toledo, Ohio, on the 4th and 11th, to 35° at Detroit, Michigan, on the 26th.

Upper lakes.—From 22° at Chicago, Illinois, on the 6th, to 30° at Alpena, Michigan, on the same date.

Extreme northwest.—From 40° at Saint Vincent, Minnesota, on the 17th, to 44° at Fort Buford, Dakota, on the 16th.

Upper Mississippi valley.—From 23° at LaCrosse, Wisconsin, on the 18th and 22d, to 34° at Keokuk, Iowa, on the 29th.

Missouri valley.—From 26° at Omaha, Nebraska, on the 26th, to 41° at Fort Bennett, Dakota, on the 25th.

Northern slope.—From 30° at Helena, Montana, on the 18th, to 47° at Fort Shaw, Montana, on the 16th.

Middle slope.—From 20° on the summit of Pike's Peak, Colorado, on the 21st, to 44° at West Las Animas, Colorado, on the 24th and 25th.

Southern slope.—34° at Fort Stockton, Texas, on the 3d and 12th.

Southern plateau.—From 28° at Fort Grant, Arizona, on the 19th, to 49° at Fort Verde, Arizona, on the 18th.

Northern plateau.—From 35° at Lewiston, Idaho, on the 17th, to 48° at Dayton, Washington Territory, on the 20th.

North Pacific coast.—From 25° at Fort Canby, Washington Territory, on the 21st, to 42° at Roseburg, Oregon, on the 20th.

Middle Pacific coast.—From 24° at San Francisco, California, on the 20th, to 37° at Red Bluff, California, on the same date.

South Pacific coast.—From 35° at San Diego, California, on the 22d, to 40° at Los Angeles, California, on the 21st.

FROSTS.

On chart v. are shown the limits within which frosts occurred during September. The following reports have been received from the various states:

Arkansas.—Fort Smith: the first frost of the season occurred on the morning of the 23d, causing slight injury to vegetation.

Frosts occurred at Lead Hill, Boone county, on the 10th and 23d.

Arizona.—Fort Apache, 25th.

Colorado.—Frosts occurred on the summit of Pike's Peak on the 5th, 7th, 8th, 13th, 14th, 15th, 22d, 23d; and at other points in the State on the 15th, 21st, 24th, 25th, 28th, and 29th.

Connecticut.—Southington, Hartford county: heavy frost occurred on the 4th, damaging the crops in some localities. Reports from the Housatonic valley state that the tobacco crop was damaged to the extent of $100,000.

Frosts also occurred at various places in this state on the 3d, 4th, 6th, 7th, 10th, 26th, and 27th.

Dakota.—Frosts occurred at various places throughout the territory on the following dates: 2d, 6th, 8th, 9th, 10th, 14th, 16th, 17th, 18th, 20th, 30th.

Delaware.—Saint George's, New Castle county, 10th.

Idaho.—Fort Lapwai, 19th, 20th; Lewiston, 20th, 26th.

Illinois.—Urbana, Champaign county: a heavy frost occurred in this region on the 9th.

Rockford, Winnebago county: frost occurred here on the morning of the 9th, causing damage to corn in low lands in this state. On the 25th a heavy frost occurred throughout the state, and ice formed in some localities. The extreme dryness of the ground and plants prevented serious damage. In Douglass, Warren, and Will counties much damage was done. In Clark and Christian counties heavy frosts occurred, but the crops were too far advanced to be injured.

Frosts occurred in northern part of Illinois on the 5th, and were of general occurrence on the 9th, 10th, 17th, 18th, 22d, 23d, and from 25th to 29th.

Indiana.—Fort Wayne: the frost of the 10th caused damage to corn and tender vegetables in the lowlands.

Frost occurred at Logansport on the 4th and 18th; at Griffin Station and Lafayette on the 6th; they were generally reported from the 8th to 12th, and on the 26th.

Iowa.—Sioux City, Woodbury county: there was a heavy frost here on the morning of the 8th. In some localities corn was injured, but the general damage was slight.

Cedar Rapids, Linn county: severe frost occurred in this locality on the mornings of the 8th, 9th, and 10th, but the crops were not injured to any extent.

Cresco, Howard county: the frost of the 7th killed all of the tender vegetation and damaged the corn crop in this locality.

Davenport: a light frost was of general occurrence over the northern half of the state on the morning of the 9th. In low lands the corn was injured, but generally the crop was not seriously damaged.

Frosts were reported by numerous stations in Iowa from the 5th to 11th, on the 16th, 17th, 18th, 21st, 22d, 25th, 26th.

Kansas.—Yates Centre, Woodson county: The first frost of the season occurred here on the 21st. Frosts also occurred in this state at Topeka, on the 17th, and Holton on the 26th.

Kentucky.—Louisville: light frost is reported to have occurred in several parts of this state on the morning of the 11th, causing serious injury to the tobacco crop on the lowlands.

Maine.—Eastport: the first frost of the season occurred at this place on the morning of the 11th, causing slight injury to vegetation in the surrounding country.

Frosts occurred at Cornish on the 4th and 10th; at Orono, on the 4th and 6th; at Bangor, on the 4th, 11th, and 29th; at Portland, on the 27th.

Maryland.—Baltimore, 10th: light frost reported from surrounding localities; no damage caused.

Massachusetts.—Springfield, 6th: a heavy frost occurred in Hampden, Hampshire, and Franklin counties on the mornings of the 4th and 6th. The tobacco crop was badly injured; in these counties the damage is estimated at more than $125,000.

Frosts were reported from other points in this state on the 6th, 9th, 10th, 11th, 26th, 27th.

Michigan.—Port Huron, 8th: the heavy frosts of the last two days killed all of the corn and buckwheat in Saint Clair county.

Detroit: the frost of the morning of the 10th was general throughout Michigan. In the vicinity of East Saginaw, the frost was unusually heavy; corn and potatoes were seriously damaged, and in many instances were entirely killed. In the counties north and west of East Saginaw serious injury was done to crops.

Frosts were reported from various places in Michigan on 2d, 3d, 5th, 6th, 8th to 12th, 17th, 18th, 19th, and from 25th to 30th.

Minnesota.—Saint Paul: heavy frosts occurred on the mornings of the 8th and 9th throughout Minnesota, Dakota, and northern Wisconsin. Reports state that the corn crop was damaged in all parts of Minnesota, especially near the Manitoba railroad.

Frosts also occurred in Minnesota on the 3d, 5th, 8th, 9th, 17th, 25th, and from the 27th to 30th.

Missouri.—Curryville, Pike county, on 9th, 26th; Pierce City, Lawrence county, 21st, 23d.

Montana.—Fort Maginnis: first killing frost of season occurred on the 20th, causing much damage to the late crops.

Frosts also occurred on the following dates: 15th, 20th, 21st, 22d, 24th, 25th, and from the 27th to 30th.

Nebraska.—Utica, York county: the frost of the morning of the 5th destroyed vines and other vegetation in this county.

Frosts occurred on other dates in Nebraska as follows: 17th, 21st, 24th, 25th, 26th.

Nevada.—Carson City, 14th, 23d, 24th, 26th, 27th.

New Hampshire.—On the summit of Mount Washington, from 1st to 6th, 9th to 12th, 17th, 18th, 25th to 30th; at other points in the state, on the 3d, 4th, 6th to 11th, 21st, 25th to 30th.

New Jersey.—At various places in the state on the 4th, 6th, 10th, 19th, 27th.

New York.—Fort Jervis, Orange county: the frost of the 4th seriously injured the corn and buckwheat crops in this county.

Factoryville, Tioga county: corn, buckwheat, and other vegetation were damaged by the frost of the 10th.

Elmira: the tobacco crop in the Chemung valley was damaged to the extent of about $100,000 by the frost of the night of the 9–10th. Buckwheat and corn were also damaged.

Lockport, Niagara county: a heavy frost occurred in this county on the morning of the 10th. The loss to farmers is estimated at from $100,000 to $200,000. The corn and tomato crop was almost entirely ruined. This frost is considered to have been the most destructive that has occurred here for ten years.

Humphrey, Cattaraugus county: a heavy frost occurred on the 10th, seriously injuring all vegetation.

Friendship, Allegheny county: the frost of the 10th killed the corn and buckwheat in this locality.

Rochester: a very heavy frost occurred throughout western New York on the night of the 10–11th. The tobacco crop, fruit, and vegetables were badly damaged.

Oswego: frost of the 11th did much damage in this part of the state.

Frosts also occurred in various parts of this state on the following dates: 2d, 3d, 4th, 6th to 12th, 18th, 20th, 22d, 23d, and from 25th to 29th.

North Carolina.—Highlands, Macon county, 27th.

Ohio.—Reports from various counties throughout Ohio, state that the frosts of the mornings of the 7th, 9th, and 10th, were very heavy, and the corn crop throughout the state was more or less injured.

Frosts occurred at various places in Ohio from the 6th to 12th, on the 18th, and on the 26th and 27th.

Pennsylvania.—Wilkesbarre, Luzerne county: the frost of the 4th killed the late buckwheat and injured the corn.

Philadelphia, 10th: frost occurred in the surrounding localities on this date, killing tender vegetation.

Frosts were reported from numerous points throughout the state on the 4th, 6th, 7th, 9th, 10th, 11th, 19th, 26th, 27th and 29th.

Ontario.—Owen Sound: a remarkably heavy frost occurred throughout this section on the night of the 9–10th. At Priceville ice formed to a thickness of one inch, wheat, oats, and vegetables were badly damaged.

Province of Quebec.—Montreal, 10th: a severe frost last night did great damage to grapes and vegetables.

Rhode Island.—The first frost of the season occurred at Point Judith and Narragansett Pier on the 27th; no damage resulted.

Tennessee.—Milan, Gibson county, 10th, 22d.

Utah.—Salt Lake City, 15th; Nephi, 27th, 28th.

Vermont.—Randolph, Orange county: the frost of the 11th destroyed vegetables and injured the corn crop in this county. Frosts occurred in this state on the following dates: 4th, 6th, 7th, 10th, 11th, 17th, 26th, 27th, 29th.

Virginia.—Marion, Smyth county, 27th.

Washington Territory.—Dayton, 19th, 20th.

West Virginia.—Helvetia, Randolph county: frost of 10th damaged the corn crop in this county.

Wellsburg, Brooke county: the corn crop and vegetation generally were injured by the frost of the 10th.

Wisconsin.—The following telegram was sent from the office of the Chief Signal Office on Friday, September 7th:

"*To the Manager, Western Union Telegraph Company, Madison, Wisconsin:*

Light frosts are indicated for the tobacco regions of Wisconsin on Saturday.

(Signed) DUNWOODY,
Assistant."

Reports of frosts which followed the above warning are as follows:

Milwaukee, 9th: the late frosts were general in this state. At Sturgeon bay the crops were entirely ruined. Reports from Appleton and Marshfield state that the corn crop was destroyed.

Fond du Lac, Fond du Lac county: a heavy frost occurred here on the morning of the 9th, doing much damage to crops, especially to corn.

Menomonee, Dunn county: the frost of the morning of the 8th did great damage to corn.

Eau Claire, Eau Claire county: the corn crop in this county was totally destroyed by the frost of the morning of the 8th.

Menasha, Winnebago county, 8th: the frost of this date caused heavy damage to crops in this county.

Milwaukee: a heavy frost occurred in Milwaukee county on the morning of the 10th, which caused a large amount of damage.

Frosts occurred on other dates as follows: 5th to 10th, 17th, 18th, 22d, 26th to 30th.

Wyoming.—Cheyenne: first frost of the season occurred at this place on the 21st.

ICE.

Ice formed during September in the following states and territories:

Colorado.—Fort Garland, 21st.

Dakota.—Wentworth, on the 9th and from the 26th to 30th; Webster, on the 8th and 30th; Alexandria, 30th. At Fort Buford ice formed to a thickness of three-fourths of an inch on the 30th.

Iowa.—Cresco, 8th; Fort Madison, 9th and 26th.

Michigan.—Lansing, 9th and 10th; Swartz creek, 9th, 10th and 26th; Ionia, 9th, 10th and 26th.

Minnesota.—Saint Vincent, 27th; Duluth, 28th.

Montana.—Fort Maginnis, 21st.

New York.—Factoryville, 1st; Palermo, 11th; Friendship, 10th.

Ohio.—Toledo, 9th.

Pennsylvania.—Pittsburg, 10th; Grampian Hills, 10th.

Vermont.—Woodstock, 4th; Strafford, 26th.

Wisconsin.—Franklin, 8th; Embarrass, 8th, 9th.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada for the month of September, 1883, as determined from reports from more than six hundred stations, is exhibited on chart iv.

In the first column of the following table is given the average rainfall for September in the various districts for several years, as determined from observations made at the Signal Service stations; in the second column is given the average for September, 1883, and the third column shows the excess or deficiency of September, 1883, as compared with the average of that month for several years:

Average precipitation for September, 1883.

Districts.	Average for September, Signal-Service observations.		Comparison of Sept., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	*Inches.*	*Inches.*
New England	3.74	2.50	1.24 deficiency.
Middle Atlantic states	4.14	4.47	0.33 excess.
South Atlantic states	5.94	6.03	0.09 excess.
Florida peninsula	6.76	5.07	1.69 deficiency.
Eastern Gulf	4.98	1.05	3.93 deficiency.
Western Gulf	4.33	3.17	1.16 deficiency.
Rio Grande valley	4.54	6.31	1.77 excess.
Tennessee	3.48	2.29	1.19 deficiency.
Ohio valley	2.49	1.53	0.96 deficiency.
Lower lakes	3.03	2.82	0.21 deficiency.
Upper lakes	3.98	2.78	1.20 deficiency.
Extreme northwest	2.24	1.01	1.23 deficiency.
Upper Mississippi valley	3.45	1.67	1.78 deficiency.
Missouri valley	2.60	2.60	Normal.
Northern slope	1.26	0.89	0.37 deficiency.
Middle slope	1.59	3.02	1.43 excess.
Northern plateau	0.78	0.06	0.72 deficiency.
Southern plateau	1.22	0.57	0.65 deficiency.
North Pacific coast	2.13	1.18	0.95 deficiency.
Middle Pacific coast	0.21	0.48	0.27 excess.
South Pacific coast	0.03	0.04	0.01 excess.
Mount Washington, N. H.	9.09	6.90	2.19 deficiency.
Pike's Peak, Col.	2.11	1.76	0.35 deficiency.
Salt Lake City, Utah	0.81	0.13	0.68 deficiency.

The monthly rainfall for September, 1883, has been slightly in excess of the average in the middle and south Atlantic states, and on the middle Pacific coast. In the middle and southern slopes and Rio Grande valley large excesses have occurred. At Fort Stockton, Texas, the monthly rainfall was 14.68, or an excess of 13.15 over the September average of the last eight years at that station. The heavy rains of the 4th

and 5th in the Rio Grande valley caused destructive floods in the Rio Grande river and its tributaries. In the Gulf states, Tennessee, the Ohio valley, and over the northern districts from New England to the Pacific coast, the rainfall has been below the average for September. In the eastern Gulf states the deficiency amounts to nearly four inches, and marked deficiencies have occurred in the upper Mississippi valley, New England, the extreme northwest, upper lake region, Tennessee, the west Gulf states and Florida. In the plateau districts and in the north Pacific coast region the deficiencies average about three-fourths of an inch. In the Missouri valley the rainfall has been normal.

The general distribution of rainfall for the month of September, with the districts of maximum departures from the normal in each year from 1873 to 1882, inclusive, are as follows:

Districts.	Maximum departures.	Year.	Remarks
		1873...	Normal in New England and in the upper Mississippi and Missouri valleys; deficient in Minnesota, the lower lake region, and Ohio valley; excessive in the Saint Lawrence valley, the middle and south Atlantic and Gulf states.
Middle Atlantic states	+ 4.00	1874...	Normal on the Pacific coast; excessive in the upper Mississippi and Missouri valleys, the middle and south Atlantic and Gulf states; deficient in Minnesota, Saint Lawrence valley, New England, and the east Gulf states.
Upper Mississippi valley	+ 3.55		
Western Gulf	+ 2.00		
Minnesota	— 1.60		
Saint Lawrence valley	— 1.05		
Lower lakes	— 1.00		
Western Gulf	+ 5.50	1875...	Normal in the lower Missouri valley; deficient on the Pacific coast, in Minnesota, the lower lake region, Ohio valley, and in the middle and south Atlantic states; excessive in the upper lake region, the upper Mississippi and Saint Lawrence valleys, New England, and the Gulf states. At Galveston, Texas, the monthly rainfall was 18.41, of which amount more than 12.00 fell during the 16th and 25th.
Eastern Gulf	+ 3.98		
Saint Lawrence valley	+ 1.50		
South Atlantic states	— 3.55		
Minnesota	— 1.95		
Ohio valley	— 1.00		
Middle Atlantic states	+ 4.10	1876...	Normal in the Ohio valley; deficient in the lake region and Gulf states; excessive in all other districts.
South Atlantic states	+ 3.85		
Upper Missouri valley	+ 3.40		
Gulf states	— 3.45		
South Atlantic states	+ 4.26	1877...	Excessive in the north Pacific coast region, Minnesota, and in the middle Atlantic and Southern states; deficient in California, in the Missouri, upper Mississippi, and Ohio valleys, and from the lake region eastward to New England.
Eastern Gulf	+ 2.76		
Western Gulf	+ 2.39		
New England	— 2.02		
Lower lakes	— 1.72		
Saint Lawrence valley	— 1.61		
South Atlantic states	+ 4.00	1878...	Excessive on the Pacific coast, in Minnesota, the Ohio and Saint Lawrence valleys, lake region, and south Atlantic states; deficient in the Missouri and upper Mississippi valleys, New England, and in the middle Atlantic and Southern states.
Portland, Oregon	+ 2.63		
Lower lakes	+ 2.37		
Upper Missouri valley	— 1.68		
Middle Atlantic states	— 1.33		
New England	— 0.75		
Eastern Gulf	+ 1.76	1879...	Deficient in California, the upper Mississippi and Missouri valleys, Tennessee, New England, the middle Atlantic and west Gulf states; excessive in all other districts
Portland, Oregon	+ 1.27		
Minnesota	+ 0.61		
Western Gulf	— 1.90		
Middle Atlantic states	— 1.24		
Upper Missouri valley	— 1.24		
Western Gulf	+ 4.24	1880...	Normal in the upper Mississippi, lower Missouri, Saint Lawrence, and Ohio valleys, and in New England; excessive in the Gulf States and Tennessee; deficient in all other districts.
Eastern Gulf	+ 1.36		
Tennessee	+ 0.66		
Florida	— 3.23		
South Atlantic states	— 3.11		
Middle Atlantic states	— 1.21		
Minnesota	+ 4.44	1881...	Deficient on the Atlantic coast and in the north Pacific coast region; excessive in all other districts, except normal in southern California.
Upper Mississippi valley	+ 3.59		
Lower Missouri valley	+ 3.03		
South Atlantic states	— 3.61		
Middle Atlantic states	— 1.41		
North Pacific	— 0.40		
Middle Atlantic states	+ 5.50	1882...	Normal in the west Gulf states, southern plateau, and in southern California; deficient in the Missouri, upper Mississippi, Rio Grande, and Saint Lawrence valleys, Tennessee, the south Atlantic and east Gulf states; excessive in all other districts.
New England	+ 5.47		
Mount Washington, N. H	+ 4.61		
Upper Mississippi valley	— 2.57		
Lower Missouri valley	— 2.15		
Pike's Peak, Colo	— 1.93		

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal Service stations are shown in the table of average precipitation for September, 1883. Voluntary observers report the following notes in connection with this subject:

Arkansas.—Lead Hill, Boone county: monthly rainfall 1.52, is 2.87 below the September average of the last two years.

Georgia.—Brunswick, Glynn county: monthly rainfall 1.20, is the smallest September rainfall of the last twenty years.

Illinois.—Anna, Union county: monthly rainfall 0.51, is 2.26, below the September average of the last eight years.

Riley, McHenry county: monthly rainfall 2.02, is 1.95 below the September average of twenty-two years.

Indiana.—Wabash, Wabash county: monthly rainfall 3.37, is 0.73 above the September average of eight years.

Vevay, Switzerland county: monthly rainfall 4.27, is 0.71 above the September average of fifteen years.

Logansport, Cass county: monthly rainfall 3.14, is 0.30 above the September average of twenty-four years. The largest September rainfall since 1859, was 7.08 in 1866; and the smallest was 0.24 in 1882.

Kansas.—Yates Centre, Woodson county: monthly rainfall 0.44, is 3.16 below the September average of the last three years.

Lawrence, Douglas county: monthly rainfall 1.25, is 1.95 below the September average of sixteen years. The total rainfall for the nine months ending September 30th, is 32.40, or 4.60 above the average of the corresponding months of the last fifteen years.

Wellington, Sumner county: monthly rainfall 4.65, is 0.07 below the September average of the last four years. The total precipitation for the nine months ending September 30th, is 33.97, or 8.90 above the average of the same months of the four preceding years.

Maine.—Gardiner, Kenebec county: monthly rainfall, 3.11, is 0.20 below the September average of a period of forty-seven years.

Maryland.—Fallston, Harford county: monthly rainfall, 5.22, is 0.31 below the September average of thirteen years. The largest September rainfall of that period, 12.95, occurred in 1876; the smallest, 1.21, occurred in 1881.

Missouri.—Saint Louis: the monthly rainfall in and around Saint Louis has been less than 0.01, which is the smallest September rainfall recorded here since 1839. Other small September rainfalls occurred as follows: 0.30 in 1844; 0.17 in 1867, and 0.33 in 1875. The largest September rainfall, 10.53, occurred in 1866. The normal rainfall for September, at Saint Louis, is 3.00.

Nebraska.—The "Nebraska Weather Service" reports the average rainfall for that state by sections, as follows: southeast, 2.12; northeast, 5.77; southwest, 2.00; northwest, 1.03; average for the state, 2.73.

New Hampshire.—Antrim, Hillsborough county: monthly rainfall, 2.85, is 0.76 below the September average of ten years.

Grafton, Grafton county: monthly rainfall, 3.42, is 1.16 below the September average of five years.

New York.—North Volney, Oswego county: monthly rainfall, 2.55, is 5.34 below the September average of twelve years.

Palermo, Oswego county: monthly rainfall, 1.83, is 3.10 below the September average of the last thirty years. The largest September rainfall of that period, 7.30, occurred in 1866; the smallest, 1.00, occurred in 1880.

Ohio.—Wauseon, Fulton county: monthly rainfall, 2.96, is 0.55 below the September average of eleven years. The largest September rainfall of that period, 5.29, occurred in 1879; the smallest, 0.55, occurred in 1871.

Pennsylvania.—Dyberry, Wayne county: monthly rainfall, 2.45, is 0.05 below the September average of the last thirteen years.

Texas.—New Ulm, Austin county: monthly rainfall, 7.71, is 1.78 above the average of twelve years. During that period the largest September rainfall, 15.08, occurred in 1874; the smallest, 0.90, occurred in 1872.

Virginia.—Variety Mills, Nelson county: monthly rainfall, 4.98, is 1.85 above the September average of the last five years.

West Virginia.—Helvetia, Randolph county: monthly rainfall, 3.09, is 1.40 below the September average of seven years.

Table of Excessive, Greatest, and Least Monthly Rainfalls.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
Arkansas.					*Alabama.*	
Little Rock	30	2.77			Mt. Vernon Barracks	0.07
Fort Smith	30	2.06			State Line	0.10
California.					Montgomery	0.22
Fort Gaston	29, 30	2.87			Uniontown	0.25
Dakota.					Pine Apple	0.48
Webster	21, 22	3.62			*Arizona.*	
Yankton	21	2.07			Casa Grande	0.00
Florida.					Fort Verde	0.00
Jacksonville	17	3.44		7.28	Texas Hill	0.00
Limona	20	3.18	3 hours		Fort Thomas	t'ce
Georgia.					Willcox	0.04
Dalton	22	2.50			Pantano	0.06
Millen	14	2.37			Benson	0.10
Eastman	14	2.20			Tucson	0.10
Indiana.					San Carlos	0.11
Marengo	22	2.49			Yuma	0.13
Vevay	23	2.25	1hr. 30 m.		Maricopa	0.30
Farmland	23	2.18			Prescott	0.33
Salem	19	2.01			Fort Grant	0.42
Mitchell	2	2.00			*Arkansas.*	
Sunman	23	2.00			Monticello	0.12
Kansas.					*California.*	
Pretty Prairie	14, 15	2.00			Anaheim	0.00
Maryland.					Byron	0.00
Fort McHenry	17	2.36			Colton	0.00
Emmittsburg	12	2.33			Dagget	0.00
Sandy Springs	11, 12	2.10			Delano	0.00
McDonough	12	2.06			Goshen	0.00
New Hampshire.					Hot Springs	0.00
Mount Washington				6.90	Indio	0.00
New Jersey.					Keene	0.00
Atlantic City	11, 12	4.32			Los Angeles	0.00
Cape May	11, 12	4.22			Mojave	0.00
Barnegat City	11, 12	3.37			Newhall	0.00
Freehold	17, 18	2.29			Poway	0.00
North Carolina.					Reno	0.00
Wilmington	10, 11	7.82	7 hr. 2 m.	16.53	San Diego	0.00
Do	14	4.88			San Fernando	0.00
Sloop Point	10, 11	6.82		14.63	Santa Barbara	0.00
Do	19	3.96			Spadra	0.00
Macon	10, 11, 12	6.67		12.69	Sumner	0.00
Do	22, 23	3.59			Tehachapi	0.00
Lumberton	11	6.20		12.50	Wadsworth	0.00
Portsmouth	11	2.40		11.24	White Water	0.00
Do	23	2.30			Fort Bidwell	t'ce
Goldsboro'	11	3.47		10.39	Tulare	t'ce
Hatteras	10, 11, 12	6.42		9.89	Brentwood	0.03
Do	22, 23	2.35			Fenner	0.00
New River Inlet	10, 11	5.92		9.49	Browns	0.07
Smithville	10, 11	5.23		8.69	Caliente	0.08
Weldon	11, 12	6.38		7.75	Lathrop	0.08
Kittyhawk	5	2.17		7.73	Solidad	0.08
Do	10, 11	2.12			Merced	0.10
Chapel Hill	18, 19	2.19		6.65	Summit	0.10
Lenoir				6.50	Turlock	0.10
Ohio					Needles	0.12
Ruggles	21	4.50		7.70	Antioch	0.13
South Carolina.					Humboldt	0.13
Florence	11	2.43		8.63	Monterey	0.19
Stateburg	14	3.52	9 h. 45 m.	6.11	Salinas City	0.19
Columbia	5	2.21			Menlo Park	0.20
Saint Matthews	14	2.18			Alcatraz Island	0.24
Texas.					Ravenna	0.24
Stockton	13	4.32	8 h. 52 m.	14.68	Angel Island	0.25
Do	17, 18, 19	7.91			Hollister	0.25
Indianola	4	3.19		9.80	Modesto	0.25
Do	5	2.18			Gilroy	0.27
Do	20	2.10			Petaluma	0.30
Brownsville	3, 4, 5	6.21		7.74	San Mateo	0.30
New Ulm	20	3.29		7.71	Pejaro	0.33
Houston				7.45	Livermore	0.35
Luling	20	4.00			Pleasanton	0.35
Fort Concho	19, 20	2.52			Willows	0.41
Rio Grande City	7	2.51			San Francisco	0.42
El Paso	18, 19	2.07			Woodland	0.44
Virginia.					Stockton	0.50
Norfolk	5	2.06		6.63	Williams	0.50
Variety Mills	11, 12	2.75			*Dakota.*	
Wytheville	24	2.40			Bismarck	0.04
Fort Monroe	11, 12	2.34			Fort Sully	0.08
Chincoteague	11	2.12			Fort Totten	0.14
West Virginia.					Fort Lincoln	0.20
Wellsburg	20	4.50	2 hr 15 m.	7 27	Fort Buford	0.22
					Florida.	
					Pensacola	0.32
					Georgia.	
					Allapaha	0.10
					Fort Gaines	0.14
					Union Point	0.36
					Bainbridge	0.48
					Idaho.	
					Lewiston	0.04
					Coeur d'Alene	0.16
					Fort Lapwai	0.28
					Illinois.	
					Swanwick	0.06
					Collinsville	0.04
					Bunker Hill	0.10
					Cairo	0.34
					Indiana.	
					Evansville	0.48
					Kansas.	
					Fort Scott	0.22
					Independence	0.27
					Yates Centre	0.44

Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration.	Amount.	Station.	Amt.
					Kentucky.	
					Louisville	0.32
					Louisiana.	
					Morgan City	0.10
					New Orleans	0.25
					Mississippi.	
					Pass Christian	0.01
					Macon	0.10
					Hernando	0.41
					Missouri.	
					Saint Charles	0.00
					Greenfield	0.00
					Saint Louis	0.01
					Louisiana	0.19
					Pierce City	0.20
					Shelbina	0.20
					Boonville	0.25
					Lamar	0.25
					Bolivar	0.30
					Mexico	0.31
					Chamois	0.35
					Macon	0.35
					Glasgow	0.39
					Carthage	0.40
					Montana.	
					Fort Keogh	0.00
					Fort Shaw	0.06
					Nebraska.	
					Marquette	0.35
					Nevada.	
					Battle Mountain	0.00
					Beowawe	0.00
					Carlin	0.00
					Palisade	0.00
					Tecoma	0.00
					Toano	0.00
					Elko	0.01
					Carson City	0.04
					Golconda	0.04
					Otego	0.04
					Wells	0.12
					Fort McDermitt	0.24
					Winnemucca	0.35
					New Mexico.	
					Lordsburg	0.11
					Fort Wingate	0.46
					Oregon.	
					Fort Klamath	0.18
					Tennessee	
					Erin	0.13
					Gadsden	0.27
					McKenzie	0.34
					Texas.	
					Orange	0.14
					Weatherford	0.15
					Belton	0.24
					Utah.	
					Corinne	0.00
					Kelton	0.00
					Terrace	0.00
					Salt Lake City	0.13
					Nephi	0.15
					Promontory	0.15
					Blue Creek	0.50
					Washington.	
					Fort Spokane	0.08
					Dayton	0.09
					Wyoming.	
					Fort Bridger	0.50

Vermont.—Woodstock, Windsor county: monthly rainfall, 2.83, is 0.43 below the September average of the last fifteen years. The monthly extremes for that period are: greatest, 6.77, in 1882; least, 1.07, in 1877.

HAIL.

The only severe hail storm reported during September passed over portions of Tennessee, Kentucky, Indiana, and Ohio, on the afternoon of the 23d. This storm is described under the heading "local storms."

Numerous hail storms, none of which are reported as being severe, occurred in the various states as follows.

Arizona.—Prescott, 9th.

Colorado.—Fort Garland, 9th, 17th; Fort Lewis, 5th; Pike's Peak, 2d, 7th, 8th; West Las Animas, 5th, 18th.

Illinois.—Peoria, 29th.

Indiana.—Fort Wayne, 29th; Griffin Station, 24th; Laconia, 23d; Logansport, 20th, 24th, 29th; Vevay, 20th; Wabash, 24th, 29th.

Iowa.—Keokuk, 7th; Nora Springs, 10th, 23d.

Kansas.—Manhattan, 13th; Wellington, 2d.

Maryland.—Fallston, 28th.

Michigan.—Traverse City, 8th.

Nebraska.—Genoa, 13th, 21st; Omaha, 22d; Red Willow, 2d, 13th, 22d.

New Jersey.—Barnegat City, 28th; Freehold, 28th; Moorestown, 30th.

New Mexico.—Fort Union, 11th.

New York.—Ithaca, 29th.

Ohio.—Cleveland, 29th; Toledo, 29th; Wauseon, 23d, 29th; Westerville, 29th.

Tennessee.—Ashwood, 4th.

Texas.—Fort Stockton, 13th, 19th.

Virginia.—Norfolk, 5th.

Wyoming.—Cheyenne, 7th.

SNOW.

Cheyenne, Wyoming.—A very light snowfall occurred here on the morning of the 22d, lasting from 6.30 to 10 a. m.

Mount Washington, New Hampshire.—The sleet storm which prevailed here on the 25th changed to snow at 10.40 p. m.

Marquette, Michigan.—Light snow fell at this place from 7.05 to 7.15 p. m. of the 27th.

Fort Totten, Dakota.—A light sprinkle of snow fell here between 8 and 9 a. m. of the 27th.

Neillsville, Clark county, Wisconsin.—Light snow fell here on the morning of the 28th.

Webster, Day County, Dakota.—The first snow of the season fell at this place on the 28th.

Saint Paul, Minnesota.—A light flurry of snow fell here from 6.20 to 10.20 p. m. on the 28th. Light snow also fell on this date at Minneapolis and Owatonna, Minnesota; and Saint Ignace and Sheboygan, Michigan. At Owatonna the walks and roofs of houses were covered to a depth of one inch.

La Crosse, Wisconsin.—A few flakes of snow fell at this place at 9 p. m. of the 29th.

Farmington, Franklin county, Maine, October 1st.—Three inches of snow fell in the northern part of this county during the night of September 29th.

SLEET.

Mount Washington, New Hampshire, 3d, 25th, 30th.
Pike's Peak, Colorado, 2d, 3d.
Traverse City, Michigan, 8th.

Table of rainy and cloudy days, relative humidity, and dew-point for Sept., 1883.

Districts.	Rainy days.	Cloudy days.	Rel. humidity.*	Dew-point.
			Percentages.	° °
New England	From 8 to 14	From 5 to 11	From 66.9 to 78.7	From 45.9 to 54.4
Middle Atlantic states	" 5 " 14	" 7 " 15	" 65.1 " 83.8	" 48.5 " 63.1
South Atlantic states	" 7 " 16	" 5 " 12	" 67.8 " 85.6	" 58.2 " 69.4
Florida peninsula	" 7 " 17	" 1 " 9	" 74.5 " 78.4	" 69.6 " 74.0
East Gulf	" 3 " 7	" 3 " 5	" 64.1 " 71.4	" 61.0 " 66.6
West Gulf	" 4 " 12	" 2 " 9	" 62.5 " 79.4	" 55.0 " 70.8
Rio Grande valley	" 6 " 9	Ten	86.6	70.2
Ohio valley	" 9 " 13	From 3 to 9	" 65.0 " 66.2	" 59.2 " 54.3
Tennessee	" 5 " 9	" 0 " 7	" 66.9 " 72.5	" 56.8 " 60.1
Lower lakes	" 12 " 17	" 3 " 15	" 67.1 " 74.5	" 47.8 " 51.8
Upper lakes	" 8 " 16	" 4 " 11	" 68.6 " 77.6	" 42.7 " 49.7
Extreme northwest	" 4 " 5	" 1 " 3	" 60.4 " 79.5	" 38.4 " 43.8
Upper Mississippi valley	" 3 " 17	" 2 " 8	" 62.1 " 70.4	" 45.9 " 56.7
Missouri valley	" 6 " 11	" 2 " 5	" 61.0 " 73.1	" 43.3 " 51.3
Northern slope	" 3 " 9	" 1 " 4	" 44.0 " 68.2	" 29.0 " 48.3
Middle slope	" 9 " 10	" 3 " 7	" 47.7 " 61.1	" 38.0 " 50.7
Southern plateau	" 1 " 8	" 0 " 3	" 39.4 " 52.6	" 36.1 " 49.9
Northern plateau	" 3 " 5	" 0 " 2	" 51.1 " 61.5	" 40.0 " 41.3
North Pacific	" 7 " 13	" 2 " 10	" 66.8 " 84.9	" 48.0 " 54.8
Middle Pacific	" 1 " 5	" 1 " 5	" 36.7 " 76.7	" 43.7 " 54.6
South Pacific	" 0 " 1	none	" 41.9 " 72.5	" 55.5 " 58.9
Mt. Washington, N. H.	Sixteen	Two	85.7	34.4
Pike's Peak, Col	Twelve	One	77.6	23.9
Salt Lake City, Utah	Five	One	35.3	39.8
Fort Stockton, Texas	Thirteen	Seven	66.9	57.0

* Relative humidity corrected for altitude.

COTTON REGION REPORTS.

In the cotton growing states the rainfall for September, 1883, as compared with that for September, 1882, shows deficiencies in all districts, except for the district of Wilmington, where there has been an excess of 5.87 inches. The largest deficiencies, 3.11, 2.83, and 2.30, occurred, respectively, in the districts of Augusta, Savannah, and Montgomery.

The means of the maxima temperatures in the western districts are higher than those for September, 1882, while in some of the eastern districts they are lower. The means of the minima temperatures are generally lower, the greatest deficiencies occurring in the districts of Little Rock, Memphis, and Charleston.

Temperature and rainfall averages for the various districts in the cotton region, as shown in the following table, are determined from observations made at the stations shown on chart vi., issued with the REVIEW for April, 1882:

Meteorological Record of the Cotton Districts for the months of September, 1882 and 1883.

Districts.	Average rainfall in inches.			Temperatures.						Extremes for Sept., 1883.	
				Mean of the maxima.			Mean of the minima.				
	1882.	1883.	Departures.	1882.	1883.	Change.	1882.	1883.	Change.	Max.	Min.
				°	°		°	°		°	°
New Orleans	2.64	1.22	— 1.42	86.7	88.4	+ 1.7	67.7	66.2	— 1.5	101	33
Savannah	4.94	2.11	— 2.83	87.1	86.5	— 0.6	67.2	65.6	— 1.6	102	49
Charleston	4.73	3.38	— 1.35	84.8	84.5	— 0.3	64.9	61.0	— 3.9	97	45
Atlanta	3.15	1.72	— 1.43	82.3	83.4	+ 1.1	62.3	61.1	— 1.2	97	40
Wilmington	3.49	9.36	+ 5.87	81.7	79.7	— 2.0	62.8	61.2	— 1.6	98	46
Memphis	1.69	1.05	— 0.64	82.7	85.3	+ 2.6	60.3	56.3	— 4.0	101	31
Galveston	3.50	2.58	— 0.92	86.8	88.7	+ 1.9	64.8	65.1	+ 0.3	101	39
Vicksburg	1.73	1.11	— 0.62	85.3	88.6	+ 3.3	61.7	61.2	— 0.5	99	45
Montgomery	3.10	0.80	— 2.30	84.3	86.5	+ 2.2	62.0	60.8	— 1.2	100	39
Augusta	4.43	1.32	— 3.11	83.9	84.8	+ 0.9	64.4	63.7	— 0.7	100	44
Little Rock	2.32	0.63	— 1.69	83.3	87.7	+ 4.4	59.0	53.3	— 5.7	102	40
Mobile	1.39	0.64	— 0.75	86.4	91.2	+ 4.8	62.8	62.8	0.0	102	40

WINDS.

The most frequent directions of the wind during September, 1883, at the Signal Service stations, are shown on chart iii., by arrows flying with the wind. In the states bordering on the Atlantic, from New Jersey southward, they were from the northeast; in New England, from the south and southwest; in the lake region, Ohio and upper Mississippi valleys, from the northeast and east; in the Missouri valley, from the north; in the west Gulf states, from the east and southeast; on the Pacific coast, from north and northwest.

TOTAL MOVEMENTS OF THE AIR.

[*In miles.*]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England	Block Island, R. I.	9,727	New London, Conn.	3,981
Middle Atlantic states	Del. Breakwater, Del.	12,666	Lynchburg, Va.	2,360
South Atlantic states	Kittyhawk, N. C.	12,438	Augusta, Ga.	2,757
Florida peninsula	Cedar Keys, Fla.	5,099	Key West	4,160
East Gulf	Pensacola, Fla.	4,573	Vicksburg, Miss.	2,324
West Gulf	Galveston, Texas	5,838	Little Rock, Ark.	2,302
Ohio valley	Louisville, Ky.	5,403	Indianapolis, Ind.	1,840
Tennessee	Nashville	3,925	Chattanooga	2,976
Lower lakes	Sandusky, Ohio	8,605	Oswego, N. Y.	4,964
Upper lakes	Grand Haven, Mich.	7,134	Chicago, Ill.	4,783
Extreme northwest	Bismarck, Dak.	6,125	Saint Vincent, Minn.	5,344
Upper Mississippi valley	Saint Louis, Mo.	7,301	Dubuque, Ia.	3,033
Missouri valley	Huron, Dak.	7,658	Omaha, Neb.	2,385
Northern slope	North Platte, Neb.	7,305	Fort Benton, Mont.	2,016
Middle slope	Fort Elliott, Texas	6,007	Denver, Col.	4,541
Southern plateau	Fort Grant, Ariz.	5,882	El Paso, Tex.	2,965
Northern plateau	Dayton, Wash.	2,799	Spokane Falls, Wash.	1,705
North Pacific	Fort Canby, Wash†	7,052	Olympia, Wash.	1 064
Middle Pacific	San Francisco, Cal.	6,779	Sacramento, Cal.	3,657
South Pacific	San Diego, Cal.	4,105	Yuma, Arizona	2,605

† For 29 days only.

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 17,665, and 10,277, miles respectively.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, maximum velocities of fifty miles or more per hour occurred on the following dates: 3d to 9th and 24th to 29th, inclusive. The highest velocities recorded were as follows: 80, nw., 3d; 72, nw., 5th; 108, nw., 9th, maximum for the month; 104, nw., 24th; 72, nw., 26th.

At Cape Mendocino, California, the wind velocities were recorded on only three days during the month, which are as follows: 68, se., 28th; 96, se., 29th; 76, se., 30th.

On the summit of Pike's Peak, Colorado, the highest velocity recorded was 52, sw., on the 1st. Other stations reporting wind velocities of forty-five miles or more per hour are as follows:

Smithville, North Carolina, 93, se., 11th.
Fort Macon, North Carolina, 60, ne., 10th.
Fort Canby, Washington Territory, 56, s., 8th.
Cape Henry, Virginia, 53, ne., 11th.
Buffalo, New York, 52, w., 25th.
Kittyhawk, North Carolina, 52, ne., 10th.
Sandy Hook, New Jersey, 50, nw., 25th.
Barnegat City, New Jersey, 49, w. 24th.
Hatteras, North Carolina, 48, ne., 10th.
Fort Stockton, Texas, 48, sw., 30th.
Cape May, New Jersey, 45, w., 25th.
Indianola, Texas, 45, e., 5th.

LOCAL STORMS.

Duluth, Minnesota, 6th.—The heavy gale of this date caused very high sea on Lake Superior. The tug "Nellie Colton" and two scows were grounded during the morning, entailing a loss of $8,000.

Port Huron, Michigan.—A severe storm prevailed on Lake Huron during the night of the 7th and on the morning of the 8th. The schooner "Winslow" and the barge "Raynor" drifted on the Canadian shore, near Point Edward.

Marquette, Michigan. A heavy northeast gale prevailed at this place on the 7th. The barge "Sumarta" dragged anchor and was blown on the beach. More than one million feet of logs were lost near Marquette.

Houston, Texas.—A violent thunder-storm passed over this place at 2 p. m. of the 7th. The rain fell in torrents for three hours. Much damage was done by lightning during the storm, several houses having been destroyed.

Port Huron, Michigan.—During the gale of the 8th numerous vessels on Lake Huron were blown ashore. On the 25th the steam-barge "East Saginaw" was driven ashore off Sand Beach during a gale, and was totally wrecked.

Fort Stockton, Texas, 13th.—A very heavy thunder-storm from the southeast, accompanied by rain and hail, occurred here on this date.

Sandusky, Ohio.—During the storm of the 17th the steamer "Saint John," from Toledo, was driven on the bar at the mouth of Sandusky bay.

Fort Stockton, Texas, 19th.—On the evening of this date a heavy storm of rain and hail prevailed at this place. The lower part of the town was flooded, and several familes were compelled to leave their homes. A number of buildings were seriously injured.

Wellsburg, Brooke county, West Virginia.—A remarkably heavy rain storm occurred here on the afternoon of the 20th, during which 4.50 inches of rain fell. The greater part of this amount fell in about fifteen minutes—from 2 to 2.15 p. m. Hail accompanied the storm, covering the ground to a depth of one inch. But little damage was caused by the storm.

Madison, Wisconsin.—A heavy storm cloud was observed west of this city on the evening of the 20th. Before reaching here it divided, passing north and south of Madison. Rain fell in torrents at this place, but no damage was done.

Steubenville, Jefferson county, Ohio.—A heavy rain storm passed over the Ohio valley, between Wheeling and Wellsburg, West Virginia, on the evening of the 21st. The storm continued two hours and caused much damage along its course. A land-slide occurred on the Pittsburg, Wheeling and Kentucky railroad, causing delay of trains.

Nashville, Tennessee.—A severe hail storm is reported to have occurred at Gallatin, Sumner county, in this state, between 5 and 6 p. m., of the 23d. The hailstones are reported to have been unusually large, some of them weighing more than two pounds. Much damage was done to buildings, trees, and crops. Large quantities of hail fell near the Cumberland river, six miles from Nashville.

Madison, Jefferson county, Indiana.—A violent wind and hail storm passed over this vicinity during the afternoon of the 23d, causing much damage to the growing crops. At Carrollton, Kentucky, twelve miles from Madison, considerable damage was done to buildings, and a number of boats were broken from their moorings. So far as is known this storm began near Hayden's on the Little Kentucky river; it crossed the Ohio river four miles from Carrollton, and then passed up the Ohio river to within a few miles of Cincinnati, Ohio. The greatest damage done was to the tobacco crop. The steamer "Samuel L. Keith" was caught in this storm when about seventeen miles below Cincinnati, and after trying for twenty minutes to force her way through the storm, was compelled to go to the bank for safety. The steamer's sky-lights were shattered by the hailstones, which were of large size. During the storm the water was kept in a continuous commotion by the falling hail, the water being splashed up to a height of several feet.

Vevay, Switzerland county, Indiana.—A violent thunder and hail storm passed over this vicinity between 1.30 and 3 p. m. of the 23d. The storm reached its maximum violence at 2.30 p. m., when the velocity of the wind was seventy miles per hour. A heavy fall of hail, lasting eight minutes, began at 2.45 p. m., accompanied by a deluge of rain, nearly 3.50 inches having fallen during the storm.

College Hill, Hamilton county, Ohio.—A violent hail storm passed over this locality between 3 and 4 p. m. of the 23d. Its path was nearly two miles wide and at the centre hail fell to depths of from two to four inches. The course of the storm was from southwest to northeast, and the fall of hail accompanying it is considered the heaviest that has been known since the settlement of this part of the country. A large amount of window-glass was destroyed, the proprietor of one green-house losing about 5,000 panes.

Buffalo, New York.—A strong gale began at this place on the afternoon of the 24th, and continued until the morning of the 25th. It reached its maximum violence at 2.38 a. m., when a wind velocity of fifty-two miles was recorded. The steam-barge "Empire State" left this port on the 25th and was driven back after having reached Erie, Pennsylvania.

Narragansett Pier, Rhode Island.—The storm of the 25th caused considerable damage to the stacked hay, oats, and corn in this vicinity.

Alpena, Michigan.—A heavy gale prevailed on lake Huron on the 25th, which caused considerable damage to shipping interests.

Toledo, Ohio.—A severe storm prevailed on Lake Erie during the early morning of the 25th, causing much damage to shipping.

Philadelphia, Pennsylvania.—During a heavy rain and hail storm on the Delaware river on the afternoon of the 28th, the boat "Lucy Wheatly" had her rigging and sails blown away. Several other boats were also damaged.

Lexington, Kentucky.—A severe storm occurred at this place on the afternoon of the 30th. A few buildings were completely destroyed, and a number were unroofed. Many chimneys, awnings, trees, &c., were blown down. The duration of the storm was about ten minutes. In the surrounding country great damage was done to barns, forests, and crops. The damage resulting from the storm in this (Fayette) county is estimated at $15,000.

Frankfort, Kentucky.—A storm of wind and rain passed over this city on the afternoon of the 30th. But little damage was done at this place, but reports from other points show the storm to have been more severe, and that it resulted in serious damage.

Eminence, Henry county, Kentucky.—A violent storm passed over Henry and Shelby counties on the afternoon of the 30th. Houses were unroofed, barns destroyed, and many forest and orchard trees were blown down.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The rivers continued low during September. In the Mississippi the highest stages were recorded from the 1st to 4th, at all points north of New Orleans, Louisiana; at that station it was highest on the 30th. The lowest stages occurred during the latter part of the month, except at New Orleans, where it was lowest on the 1st.

The Ohio river fell to one inch above low-water mark on the 16th, at Pittsburgh, Pennsylvania, and was very low throughout its course the entire month.

In the Missouri river the highest water was observed on the 1st and 2d, and the lowest at the end of the month.

At Nashville, Tennessee, the Cumberland river was closed to navigation on account of low-water during the whole month.

The highest and lowest stages of water observed at the Signal Service stations during September, 1883, are shown in the following table:

Heights of rivers above low-water mark, September, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
Red River:	Ft. In.		Ft. In.		Ft. In.
Shreveport, La	29 9				
Arkansas:					
Little Rock, Ark*	30 0	27, 28	4 8	11	2 8
Fort Smith, Ark		18	3 0	23	1 3
Missouri:					
Yankton, Dakota	20 0	1, 2	2 2	29, 30	1 0
Omaha, Nebr	16 0	2	7 7	29, 30	5 1
Leavenworth, Kans	21 0	1	8 11	21, 23, 24	6 4
Mississippi:					
Saint Paul, Minn	14 6	4	3 3	16, 30	1 6
La Crosse, Wis	18 0	1	1 11	20	1 0
Dubuque, Iowa	21 10	1	4 10	22	3 3
Davenport, Iowa	15 0	1	3 4	18, 23	2 0
Keokuk, Iowa	14 6	3	3 8	26, 27	2 2
Saint Louis, Mo	30 0	1	11 0	28, 29, 30	7 0
Cairo, Ill	40 0	1	10 5	30	4 8
Memphis, Tenn	34 0	1	8 2	30	2 4
Vicksburg, Miss‡	41 0	1	13 8	30	3 5
New Orleans, La†	—2 6	30	13 1	1	11 5
Ohio:					
Pittsburg, Pa	20 0	1	1 9	16	0 1
Cincinnati, Ohio	50 0	30	5 9	20	3 7
Louisville, Ky	24 0	1, 2, 3	4 3	24, 25	3 1
Cumberland:					
Nashville, Tenn	42 0	1	1 6	18, 19, 20	0 5
Tennessee:					
Chattanooga, Tenn	33 0	28	2 6	19	0 0
Monongahela:					
Pittsburg, Pa	29 0	1	1 9	16	0 1
Savannah:					
Augusta, Ga	30 0	27	5 8	16	3 10
Willamette:					
Portland, Oreg		2	4 1	26	1 0
Sacramento:					
Red Bluff, Cal		30	0 7	1	0 6
Sacramento, Cal		2	6 9	28	6 6
Mobile:					
Mobile, Ala		15	17 7	21, 24	15 4
Colorado:					
Yuma, Arizona		1	16 10	30	14 9

* The zero of river gauge was raised nine inches on the 22d, and readings corrected to same level for entire month. † Below high-water marks of 1874 and 1883. ‡ No observations on 6th and 7th. Gauge broken.

FLOODS.

Laredo, Texas.—The rain storm of the 4th and 5th was the heaviest that has been experienced here for a number of years. On the morning of the 5th about one-half of the city was covered with water. The walls of a large brick building erected for the Laredo water-works, were badly damaged. Trains from San Antonio and Corpus Christi were delayed on account of the washing away of bridges. The Rio Grande river rose seven feet in five hours on the 5th, and it continued to rise until noon of the 6th, when it had risen eighteen feet. Washouts occurred on the International and Texas-Mexican railways. Several houses on the Mexican side of the Rio Grande river were inundated on the 6th, and a large part of the Mexican National railroad bridge across the Rio Grande was washed away.

Reports from Corpus Christi on the 10th state that the recent rains caused all of the creeks west of that place, which had been dry during the entire summer, to rise to depths from twenty to forty feet. Large numbers of horses, cattle, and sheep were swept away by the strong currents and were drowned. The Texas-Mexican railway lost eleven bridges and culverts, and several miles of railroad track between Corpus Christi and Laredo. On one section of the Texas-Mexican road, near Pena station, five bridges and one and one-half miles of the road-bed were washed away. At San Diego, Duval county, a bridge four hundred and fifty-six feet in length was washed away, and also another large bridge over the Salado river in Mexico. At Magultaras station, on the Texas-Mexican railroad, about 1,100 sheep were drowned. On the 9th the Rio Grande had fallen to within a few feet of its former level.

HIGH TIDES.

Portsmouth, North Carolina, 11th.—Very high tide; island submerged one foot. High tide also on the 9th and 10th.

Sloop Point, North Carolina, 8th to 11th, 13th, 19th, 20th.

Cape Lookout, North Carolina, 11th, 20th, 21st.

Cedar Keys, Florida, 18th.

Block Island, Rhode Island, 21st.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for September, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 87.61 per cent. The percentages for the four elements are: weather, 87.70; direction of the wind, 85.13; temperature, 87.43; barometer, 90.36 per cent. By geographical districts they are: For New England, 87.50; middle Atlantic states, 89.38; south Atlantic states, 85.89; eastern Gulf, 86.43; western Gulf, 88.59; lower lakes, 87.99; upper lakes, 84.55; Ohio valley and Tennessee, 92.10; upper Mississippi valley, 87.22; Missouri valley, 85.13; north Pacific, 86.54; middle Pacific, 93.97; south Pacific, 98.21.

There were one hundred and twenty-six omissions to predict out of 3,690, or 3.41 per cent. Of the 3,564 predictions that have been made, one hundred and six, or 2.79 per cent., are considered to have entirely failed; seventy-five, or 2.10 per cent. were one-fourth verified; four hundred and twenty, or 11.79 per cent. were one-half verified; two hundred and seventy-eight, or 7.80 per cent., were three-fourths verified; 2,685, or 75.34 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During September, 1883, one hundred and nineteen cautionary signals were displayed. Of these, ninety-six, or 80.7 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. Eleven cautionary off-shore signals were displayed, of which five, or 45.5 per cent., were fully justified; nine, or 81.8 per cent., were justified as to velocity only; and two were not justified either as to direction or velocity. One hundred and thirty signals, of all kinds, were displayed, of which one hundred and one, or 77.7 per cent., were fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Seven signals were ordered late.

Eighty-three winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered. Many of these were high local winds or strong sea-breezes.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during September, 1883, with average depth at which the observations were made, are given in the table below. The highest water temperature recorded during the month, 89°.1, occurred at Charleston, South Carolina; and the lowest, 47°.3, occurred at Alpena, Michigan. The largest monthly ranges are: Alpena, Michigan, 18°.4; Chincoteague, Virginia, 15°; Grand Haven, Michigan, 14°.5; Smithville, North Carolina, 13°.9; Fort Macon, North Carolina, 13°.5; Toledo, Ohio, 13°.4; Galveston, Texas, 13°. The smallest

monthly ranges are: Eastport, Maine, 2°.4; San Francisco, California, 3°.3; and 5° at Jacksonville, Florida, New London, Connecticut, and Provincetown, Massachusetts.

Temperature of Water for September, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	70.7	64.5	6.2	3	6	68.1
Alpena, Michigan	65.7	47.3	18.4	12	6	52.8
Augusta, Georgia	85.0	74.0	11.0	4	6	73.8
Baltimore, Maryland	75.0	66.0	9.0	10	0	68.1
Block Island, Rhode Island	66.5	58.9	7.6	8	6	61.5
Boston, Massachusetts	62.8	60.5	2.3	21	6	59.3
Buffalo, New York	69.3	57.0	12.3	10	4	57.5
Cedar Keys, Florida	89.1	78.5	10.6	11	3	79.9
Charleston, South Carolina	81.6	72.1	9.5	41	0	74.3
Chicago, Illinois	67.7	58.0	9.7	8	6	60.7
Chincoteague, Virginia	79.0	64.0	15.0	5	9	67.5
Cleveland, Ohio	70.5	60.8	9.7	14	0	59.5
Detroit, Michigan	70.0	58.8	11.2	23	2	59.7
Delaware Breakwater, Delaware	72.2	65.3	6.9	8	6	66.7
Duluth, Minnesota	59.3	50.1	9.2	15	5	54.6
Eastport, Maine	50.9	48.5	2.4	15	11	55.3
Escanaba, Michigan	64.0	53.0	11.0	16	7	53.3
Galveston, Texas	85.0	72.0	13.0	11	1	79.3
Grand Haven, Michigan	71.6	57.1	14.5	19	0	57.0
Indianola, Texas	86.5	73.6	12.9	8	7	78.2
Jacksonville, Florida	84.0	79.0	5.0	18	0	76.5
Key West, Florida	88.8	83.0	5.8	17	8	82.9
Mackinaw City, Michigan	64.7	54.3	10.4	12	0	54.2
Fort Macon, North Carolina	82.5	69.0	13.5	8	5	72.8
Marquette, Michigan	58.0	49.0	9.0	9	10	53.9
Milwaukee, Wisconsin	64.4	56.0	8.4	8	0	56.9
Mobile, Alabama	89.0	79.5	9.5	16	4	77.9
New Haven, Connecticut	69.7	61.4	8.3	15	1	60.1
New London, Connecticut	68.0	63.0	5.0	13	3	61.1
New York City	70.6	63.8	6.8	17	4	63.1
‡Norfolk, Virginia	75.1	66.9	8.2	17	7	70.5
Pensacola, Florida	84.7	77.2	7.5	17	2	77.2
Portland, Maine	57.8	52.5	5.3	18	3	59.2
Portland, Oregon	61.6	56.3	5.3	55	6	61.2
Provincetown, Massachusetts	64.0	59.0	5.0	12	2	60.8
Sandusky, Ohio	70.0	57.3	12.7	10	11	61.2
Sandy Hook, New Jersey	69.4	63.5	5.9	2	0	64.3
San Francisco, California	61.5	58.2	3.3	39	2	62.1
Savannah, Georgia	81.3	75.8	5.5	11	10	74.8
Smithville, North Carolina	83.3	69.4	13.9	10	0	72.4
Toledo, Ohio	73.7	60.3	13.4	12	3	60.6
Wilmington, North Carolina	79.6	69.0	10.6	27	3	72.1

° No observations taken from 8th to 26th, inclusive. Instrument broken.
‡ No observations taken from 19th to 23d, inclusive. Instrument broken.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were frequent during the month. Those of the nights of the 15th and 16th were the most extensively observed. The various displays have been reported, as follows:

Duluth, Minnesota, 2d: an auroral display was observed here from 8.30 to 11.30 p. m. It consisted of pale yellow light, with luminous beams, reaching an altitude of from twenty to thirty degrees above the horizon.

Saint Vincent, Minnesota, 2d: A faint auroral light was visible here from 8 p. m. to midnight.

Escanaba, Michigan, 2d: Aurora from 9 to 11 p. m., first appearing as a pale green light and later assuming the form of a double arch.

Eastport, Maine, 2d: A brilliant aurora, of pale yellow color, was observed from 7.30 p. m. to midnight. Faint streamers appeared between 7.50 and 8.20 p. m.

This display was also noted at Traverse City and Lansing, Michigan; Embarrass, Wisconsin, and at Gardiner, Maine.

Mackinaw City, Michigan, 3d: a brilliant auroral display was observed at 8.25 p. m., extending across the heavens from east to west. The display faded away at 9.50 p. m., and reappeared at 10.10 p. m., finally disappearing at 11.20 p. m.

On the 4th a faint display was observed at numerous points from Dakota eastward to Michigan. It was also observed as a faint display at Cambridge, Massachusetts.

On the 5th an auroral display was quite generally observed in New England and the lake region; it was observed as far westward as northern Dakota; the most southerly station reporting it was Moorestown, New Jersey.

Wentworth, Dakota, on the 7th.

Johnson, Nebraska, on the 8th.

Polo, Illinois, on the 9th and 10th.

Saint Vincent, Minnesota, 13th.

On the 15th, a display was reported by numerous stations in Montana; the limits of observation extending eastward to Dakota, westward to Washington Territory, and southward to Cheyenne, Wyoming.

At Helena, Montana, it was observed at 9 p. m., as a diffuse light, which gradually extended and increased in brilliancy until a complete corona was formed. The display ended at 9.40 p. m.

The display of the 16th was observed at scattering stations from the north Pacific coast to the lake region.

At Fort Canby, Washington Territory, it was observed at 7.45 p. m., consisting of three dark-red slender columns, gradually decreasing in brilliancy until 9 p. m., when they disappeared.

At Fort Maginnis, Montana, the auroral beams extended to the zenith.

Milwaukee, Wisconsin, 16th: at 7.30 p. m. an auroral light of pale straw color covered the northern sky with beams extending to an altitude of 85°.

Marquette, Michigan, 16th: a brilliant aurora was observed here at 7.10 p. m., consisting of luminous waves of light shooting up from every part of the northern sky, forming a perfect corona, which continued a few minutes, when it spread over the sky. The colors were varied and very beautiful. The display ended at 9.20 p. m.

Other auroral displays were reported by the following stations:

18th.—Fort Buford, Dakota; Saint Vincent, Minnesota; and Holton, Kansas.

21st.—Milwaukee, Wisconsin.

22d.—Fort Totten, Dakota.

23d.—Chambersburg, Pennsylvania.

24th.—Fort Buford, Bismarck, and Alexandria, Dakota; and Wilkesbarre, Pennsylvania.

25th.—Eastport, Maine; Point Judith, Rhode Island; Cleveland, Ohio; Alpena, Escanaba, and Traverse City, Michigan; Polo and Riley, Illinois; Dubuque, Iowa; Wentworth and Fort Totten, Dakota.

26th.—Escanaba, Michigan; Toledo, Ohio; Wentworth, Dakota; and Saint George's, Delaware.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—12th, 17th, 18th, 24th, 27th to 30th.

Middle Atlantic states.—2d, 4th, 5th, 12th, 15th, 17th, 18th, 24th, 28th, 29th, 30th.

South Atlantic states.—3d, 4th, 5th, 10th, 13th to 19th, 23d, 24th, 27th, 30th.

Florida peninsula.—1st to 4th, 6th, 7th, 8th, 17th, 18th, 20th, 21st, 25th, 29th.

Eastern Gulf.—4th, 12th, 13th, 15th, 16th, 17th, 20th, 22d, 29th.

Western Gulf.—2d to 8th, 14th, 15th, 16th, 20th, 29th, 30th.

Tennessee.—2d to 5th, 9th, 16th, 18th to 23d, 30th.

Ohio valley.—2d, 3d, 4th, 7th, 8th, 16th, 19th to 24th, 28th, 29th, 30th.

Lower lakes.—2d, 4th, 16th, 20th to 24th, 29th, 30th.

Upper lakes.—1st, 4th, 6th, 7th, 9th, 15th, 16th, 20th to 24th, 27th, 28th, 29th.

Upper Mississippi valley.—1st, 2d, 4th to 8th, 10th, 13th, 15th, 16th, 20th, 22d, 23d, 24th, 29th, 30th.

Missouri valley.—1st, 5th, 6th, 7th, 10th, 12th to 15th, 18th, 19th, 20th, 23d, 29th, 30th.

Northern slope.—1st, 3d, 4th, 5th, 7th, 9th, 11th, 12th, 13th, 19th.

Middle slope.—1st to 9th, 12th to 15th, 17th, 18th, 21st, 30th.

Southern slope.—4th, 5th, 8th, 11th, 13th, 16th, 19th, 29th, 30th.

Southern plateau.—6th to 9th, 11th, 18th, 19th, 27th, 28th, 29th.

Thunder-storms were also reported from the following stations not included in the districts named above:

4th.—Roseburg and Albany, Oregon.

5th.—Roseburg, Oregon, Fort Lapwai, Idaho, and Salt Lake City, Utah.

6th.—Salt Lake City, Utah.

10th.—Fort Totten, Dakota, and Nephi, Utah.

12th.—Fort Buford, Dakota.

18th.—Los Angeles, Poway, and San Diego, California.

19th.—Poway, California.

21st.—Carson City, Nevada.

30th.—Nephi, Utah.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—6th, 10th, 11th, 12th, 15th, 17th, 19th to 22d, 24th, 28th.

Middle Atlantic states.—5th, 6th, 8th, 10th, 11th, 14th, 16th, 18th to 21st, 28th.

South Atlantic states.—11th, 15th, 18th, 21st, 28th.

Western Gulf.—5th, 6th, 7th, 9th, 14th, 15th, 19th, 20th, 27th, 28th.

Tennessee.—7th, 8th, 13th, 16th, 28th.

Lower lakes.—12th, 16th, 19th, 20th, 28th.

Middle Slope.—9th, 15th, 27th, 28th, 29th.

Solar halos were also observed at the following stations not included in the districts named above:

California.—San Francisco, 10th, 21st, 24th, 27th to 30th.

Florida.—Key West, 25th, 27th; Pensacola, 12th, 24th.

Idaho.—Fort Lapwai, 14th.

Illinois.—Anna, 28th; Cairo, 4th; Riley, 6th, 19th.

Indiana.—Vevay, 29th; Wabash, 5th.

Iowa.—Keokuk, 7th.

Kansas.—Fort Scott, 27th.

Michigan.—Alpena, 29th; Grand Haven, 27th.

Minnesota.—Saint Vincent, 24th.

Mississippi.—Vicksburg, 19th.

Ohio.—Columbus, 12th.

Texas.—Fort Stockton, 18th.

Utah.—Nephi, 16th; Salt Lake City, 11th, 24th.

Washington Territory.—Dayton, 8th; Fort Canby, 16th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—10th to 14th, 16th, 19th, 20th, 22d.

Middle Atlantic states.—9th to 14th, 16th to 22d.

South Atlantic states.—10th, 12th, 14th, 17th, 18th, 19th.

Eastern Gulf.—8th, 12th, 15th, 16th, 19th.

Western Gulf.—9th to 20th.

Tennessee.—10th, 12th, 14th, 16th, 19th.

Ohio valley.—10th, 12th, 13th, 16th.

Lower lakes.—11th to 14th, 17th to 20th.

Upper lakes.—11th to 17th, 19th.

Upper Mississippi valley.—7th, 14th, 15th.

Missouri valley.—9th, 10th, 12th, 13th, 14th, 19th.

Lunar halos were also observed at the following stations, not included in the districts named above:

Arizona.—Prescott, 10th.

California.—San Francisco, 15th.

Colorado.—West Las Animas, 9th.

Dakota.—Bismarck, 17th; Fort Totten, 28th.

Florida.—Sanford, 14th, 15th.

Kansas.—Salina, 14th; Yates Centre, 9th.

Nebraska.—North Platte, 14th.

Ohio.—Columbus, 18th.

Oregon.—Albany, 15th.

Pennsylvania.—Pittsburg, 11th.

Texas.—Brownsville, 17th; Fort Concho, 17th; Fort Stockton, 11th.

Utah.—Nephi, 16th.

Washington Territory.—Fort Canby, 10th.

MIRAGE.

Block Island, Rhode Island, 26th.—The main land at Point Judith was visible to-day from 7 a. m. to 4.30 p. m.

Salina, Kansas, 19th, 24th, 28th.

Indianola, Texas, 16th, 23d, 24th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and forty-one stations show 4,203 observations to have been made, of which three were reported doubtful; of the remainder, 4,200, there were 3,660, or 87.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of September, 1883, has been forwarded by Professor D. P. Todd, Director of the Lawrence observatory, Amherst, Massachusetts:

Date—Sept., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 8 a. m.	1	20‡	0	10‡	1	3	7	95‡	
2, 9 a. m.	1	10‡	2	5	1	5	6	80‡	
3, 10 a. m.	1	3	0	10‡	1	1	7	55‡	
4, 10 a. m.	1	1	1	5	1	1	7	40‡	
5, 9 a. m.	0	0	1	4	0	0	5	30‡	
6, 5 p. m.	0	0	0	5	0	0	5	20‡	
9, 10 a. m.	1	6	.....	.....	1	6	0	20‡	One of the spots very large.
10, 4 p. m.	2	13‡	1	2	1	3	6	30‡	Do.
11, 4 p. m.	0	10‡	1	3	0	2	5	35‡	Do.
15, 12 m	3	15‡	.....	.....	.....	.....	6	50‡	
16, 10 a. m.	0	0	1	3	0	0	5	45‡	
18, 5 p. m.	0	0	.....	.....	0	0	5	25‡	Broad areas of faculæ.
19, 11 a. m.	0	0	0	5	0	0	4	20‡	
21, 4 p. m.	0	0	2	10‡	0	0	2	10‡	Veiled spots.
22, 11 a. m.	1	3	0	3	0	0	2	10‡	Do.
25, 3 p. m.	0	0	.....	.....	0	0	0	0	
26, 11 a. m.	3	8	0	0	1	2	3	8	Do.
27, 3 p. m.	0	0	0	0	0	0	2	6	Do.

Faculæ were seen at the time of every observation. ‡Approximated.

Mr. William Dawson, of Spiceland, Indiana, reports having observed sun spots during September, as follows:

1st.—Seven groups, ninety spots; one group of six prominent spots, three of which were quite large, appeared in the southeast quadrant.

3d.—Eight groups, sixty-six spots; one spot 9,000 miles long and 6,500 miles wide was faintly visible to the naked eye.

5th.—Six groups, sixty spots; the large spot observed on the 3d appeared much broken.

10th.—Five groups, fifty spots; one of which was visible to the naked eye.

13th.—The large spot seen on the 10th was still plainly visible without the telescope.

14th.—Six groups, eighty spots; the large spot before mentioned was much broken on this date, but it was still visible to the naked eye.

19th.—Four groups, forty spots.

21st.—Two groups, seventeen spots, fourteen of which were near the western edge.

24th.—Three groups, seven small spots.

26th.—Two groups, seven spots; one large spot at east edge.

28th.—Four groups, seventeen spots.

29th.—Five groups, twenty-two spots, all of which, with one exception, were very small.

Mr. H. D. Goway, at North Lewisburg, Ohio, reports that sun spots were observed at that place on all clear days during the month.

The s. s. "Hevelius," on the 10th and 11th, at Bahia, Brazil, and from the 12th in S. 11° 00′, W. 35° 30′, to the 21st, in N. 27° 07′, W. 21° 30′; observed daily a large spot on the sun, which disappeared on the last-named date.

The s. s. "Llandaff City" observed sun spots, as follows:

on the 1st in N. 40° 18′, W. 70° 20′; observed one spot. 3d: in N. 40° 30′, W. 63° 30′; observed three spots. 5th: in N. 41° 40′, W. 54° 15′; observed four spots. 8th: in N. 45° 48′, W. 41° 21′; observed three spots. 10th: in N. 48° 17′, W. 31° 35′; observed one spot. 11th: in N. 50° 12′, W. 26 13′; observed a large spot on the sun at sunset.

METEORS.

Augusta, Georgia.—At 7.27 p. m., of the 4th, a large meteor appeared in the northern sky at an elevation of about 45° and fell to the horizon.

Highlands, North Carolina.—A brilliant meteor, (probably the same as reported from Augusta) was seen here between 7 and 8 p. m., of the 4th; it passed in a southwesterly direction, and exploded when near the horizon.

Sanford, Florida, 7th.—At 10.25 p. m. a bright meteor shot across the sky from the northwest, and disappeared beneath the southern horizon. It was apparently from six to eight inches in diameter, and resembled a ball of fire.

Block Island, Rhode Island, 22d.—A small meteor shot across the northwestern sky at 8 p. m., and broke into two parts before disappearing.

Bangor, Maine, 27th.—A brilliant meteor was seen in the eastern sky at 11 p. m., of the 28th, lighting up the sky like a flash of lightning.

San Francisco, California.—A brilliant meteor was observed here at 11.55 p. m., of the 28th. It passed from the zenith in a southwesterly direction, apparently going into the bay. As it approached the earth it increased in size and brightness, leaving behind it a trail similar to that of a rocket.

Meteors were also observed at the following places during the month:

2d.—Variety Mills, Virginia.
3d.—Woodstock, Maryland.
4th.—Clay Centre, Kansas; Woodstock, Maryland.
5th.—Variety Mills, Virginia; Woodstock, Maryland.
7th.—Woodstock, Maryland.
8th.—Leetsdale, Pennsylvania.
14th.—Ames, Iowa.
17th.—Lead Hill, Arkansas.
19th.—Salina, Kansas; Fallsington, Pennsylvania.
20th.—Woodstock, Maryland.
24th.—Woodstock, Maryland; Marion, Virginia.
25th.—Salina, Kansas.
26th.—Woodstock, Maryland; Princeton, Massachusetts; Brevard, North Carolina; Ames, Iowa.
27th.—Woodstock, Maryland.
28th.—Yuma, Arizona; San Francisco, California.
30th.—Woodstock, Maryland.

EARTHQUAKES.

Los Angeles, California.—On the morning of September 1st two light shocks of earthquake were felt at this place. The first shock was felt at 8.25 a. m., the vibration being from north to south; the second shock succeeded the first after an interval of about four seconds. At 4.20 a. m., of the 5th, another heavy earthquake shock occurred. The vibrations were from northeast to southwest, and were sufficient to displace light articles of furniture and to cause chandeliers to sway with considerable motion.

The following extract is taken from "Nature," of September 6th, 1883:

A sharp shock of earthquake was felt at 8 o'clock on September 2d at Frascati, on the Alban hills, twelve miles from Rome, Italy. The movement was undulatory and lasted several seconds, but without causing any damage. The instruments in the observatory of the Roman college at the same time showed a sensible undulatory movement in the direction of from northeast to sonthwest. The earthquake was felt simultaneously at Albano, Ariccia, Genzano, Roccadi, Papa, Monte Porzio, and at other towns on the Alban hills.

Berlin, Germany, September 6th.—There were several shocks of earthquake at Dusseldorf on the night of the 4–5th. Shocks were also felt on the island of Ischia at the same time, which created some alarm, but caused no damage.

Santa Barbara, California, 5th.—At 4.15 a. m., of this date, an earthquake shock of fifteen seconds' duration was felt here; vibration from north to south. Another shock, lasting five seconds, occurred at 2.30 p. m., of the 13th.

San Francisco, California, 5th.—Reports from Wilmington and Los Angeles, in this state, announce that sharp shocks of earthquake were felt at those places at 4.30 a. m., of this date. The vibrations were from northwest to southwest.

Lima, Peru, September 8th.—Prolonged shocks of earthquake were felt at this place at 11 p. m., of September 6th. At 4.10 a. m., of the 10th, an unusually strong shock of earthquake was felt here. Its duration was fifteen seconds, and the direction of vibration was from south to north.

London, England.—Earthquake shocks were felt at Casamicciola, on the island of Ischia, during September 9th and 10th.

Greensborough, Guilford county, North Carolina.—An earthquake shock was felt at this place on the morning of the 21st. At 6.45 o'clock a heavy rumbling noise was heard, which was instantly followed by a severe shake of the earth, lasting about one minute. The shock was most severe in the western part of the town. The houses shook as if there had been an explosion near by. Some alarm was caused, but no damage was done.

Naples, Italy, September 23d.—Two severe shocks of earthquake were felt at Casamicciola on this date. One house was wrecked, but no lives were lost.

Portland, Oregon.—Two light shocks of earthquake were felt here at about midnight of 28–29th. They were not violent, but were sufficient to cause a slight movement of lamps, furniture, &c.

London, England, September 26th.—Advices from Colombo, Ceylon, state that the recent earthquake in Java caused a sudden subsidence of the sea, at Colombo, of fifteen feet. On August 27th the water rose and fell violently for half an hour, at the end of which time it resumed its normal condition. Several vessels broke from their moorings, but no other damage was reported. (See page 192 of the August REVIEW for account of similar phenomenon, observed at San Francisco, California.)

DROUGHT.

Owing to the small monthly rainfall of September and the deficiencies of the preceding months, July and August, the drought which began in those months has continued unbroken in many sections of the country during September. The following figures show the departures from the average rainfall in the southern states for July, August, and September, 1883, as compiled from the Signal Service records:

Districts.	July.	August.	September.	Total.
Tennessee	−0.99	−0.41	−1.19	−2.59
South Atlantic	−0.73	−0.72	+0.69	−0.76
Eastern Gulf	−2.54	−1.94	−3.93	−8.41
Western Gulf	−1.72	−2.65	−1.16	−5.53

The following notes relating to the drought of September, 1883, have been collected from the various states:

Alabama.—Montgomery, 28th: reports from surrounding localities state that wells are drying up, and in some sections water for stock is hauled long distances. Crops are suffering for rain.

Arkansas.—Little Rock, 11th: the cotton and wheat crops are suffering from the effects of drought in this part of the state.

Fort Smith, 15th: the rain of this date ended the drought which prevailed in this locality. It is considered that the cotton crop has been damaged to the extent of from 25 to 50 per cent.

Georgia.—Atlanta: the following extract is taken from the September report of the commissioner of agriculture for this state: * * * "The growing season, now drawing to a close, has been remarkable in this, that there has been no general rain, reaching over the entire state, since April 23d. In different sections of the state and at different times, the prevailing drought has

broken once or twice, but in some localities there has not been a good season since the date just mentioned. It is well said by one of the correspondents that the year has been one of a succession of long droughts and intensely hot spells. Even when rains have fallen they have not, as a rule, been followed up or repeated at short intervals, and, consequently, have only saved the leading crops from total failure."

Florida.—Pensacola, 23d: owing to the prolonged drought the fields in this vicinity are thoroughly parched, and vegetation completely dried up.

Illinois.—Edgington, Rock Island county, 30th: but little rain has fallen here since July 20th. The ground is very dry and vegetation is suffering.

Indiana.—Vevay, Switzerland county: from the 1st to 20th, vegetables suffered from lack of rain; the pastures became dry and parched, and the sowing of wheat has been delayed. The precipitation during the first nineteen days was only .27 inch, but from the 20th to the 30th more than 4.00 inches fell, which proved of great benefit to the suffering vegetation.

Salem, Washington county, 30th: drought has prevailed in this locality during the month, and the seeding of the wheat crop has been delayed in consequence.

Kansas.—Yates Centre, Woodson county, 30th: wells and springs in this part of the state are drying up, and streams are very low.

Independence, Montgomery county, 30th: the past month has been the driest September recorded at this place. Rainfall for the month is .88 inch. Wells and streams are drying up.

Louisiana.—Grand Coteau, Saint Landry parish, 30th: owing to the prolonged drought, cisterns are becoming exhausted, and cattle on the prairies are suffering for water. Only about one-third of the average yield of corn and cotton will be produced.

Maine.—Bangor, 30th: the drought which prevails throughout New England is especially severe in the Penobscot valley. Wells, springs and streams have become dry. Farmers are compelled to drive their stock long distances for water, and in Bangor teams are employed for hauling water to houses in the outskirts of the city. The grass in pastures has dried up and become worthless for grazing. Many saw mills were shut down during the early part of the month, and others have been compelled to partially suspend work.

Massachusetts.—Boston, 7th: the severe drought which prevails throughout New England has seriously damaged the crops and dried up streams and wells.

Wareham, Plymouth county, 10th: the drought of the past six or eight weeks has been the severest experienced here for a number of years. On many farms vegetation has been so dried that copious rains would not restore it. Pasturage throughout the Cape Cod district is very poor, and the recent rains have proved of little benefit.

Mendon, Worcester county, 30th: scarcity of water exists in this part of the state. Many wells have become dry and water for household purposes is hauled long distances.

Missouri.—Lawrence county, 30th: September was a remarkably dry month in this part of Missouri. The monthly rain was only 0.20 inch.

New Hampshire.—Dover, Strafford county, 22d: great scarcity of water exists at this place, and the mills in the surrounding country are shut down in consequence. Wells and streams are dried up, and cattle are driven long distances for water.

Bristol, Grafton county, 30th: During September the water in New Found lake fell sixteen inches, which is the greatest fall for one month that has been noted for several years.

Manchester, Hillsborough county, October 1st: the recent heavy rains have given sufficient water-power to all the mills in this city which have been idle some weeks, enabling them to resume work on this date.

Tennessee.—Nashville: the following extract is taken from the September report of the Commissioner of Agriculture for Tennessee: * * * "The drought which began early in August has continued throughout September, and has been general. In some localities, notably in the Eastern Division, it has been almost unprecedented in its severity. Late corn and other unmatured crops have been cut short, and, in many instances, stock has suffered on account of pastures drying up. In the Middle Division the drought has not been so severe, and crops generally are in a fair condition. In the Western Division crops have suffered greatly, more especially cotton, which has been materially reduced in all of the cotton-growing counties, by drought and rust combined. * * * Plowing for seeding wheat and other grains has been greatly retarded in all parts of the state on account of the dryness and hardness of the soil, and planting will necessarily be late."

Virginia.—Petersburg, 11th: the protracted drought, which has done great damage to the crops throughout Virginia, was ended by the heavy rain of this date. In consequence of the drought the streams were almost completely dry, and the water in the city reservoir had become so low that the city was threatened with a water famine.

PRAIRIE AND FOREST FIRES.

Philadelphia, Pennsylvania, 6th.—Serious forest fires are reported from the lower parts of Camden and Atlantic counties, New Jersey. Much damage has been done to the timber lands.

Boston, Massachusetts, 7th.—Forest fires have been burning for several weeks in some of the outlying towns near this city.

From the south shore stretching around to the west, and reaching eastward to Massachusetts bay, numerous fires have been beyond control, and the country for miles around presents a blackened and desolate appearance. The extensive fires which have raged on the south shore branch of the Old Colony railroad have burned over thousands of acres. In many instances it was necessary to call out the fire departments in Quincy, Braintree, Weymouth, Higham, and Cohasset, and much valuable property was saved through their exertions. In many cases the scarcity of water from the extreme drought made it very difficult to extinguish the fires.

New York City, 7th.—For several miles on both sides of the railroad track, between Long Island City and Sag Harbor, much timber land has been burned over. On Hemstead plains to the eastward of Garden City, the fires burned the grass and brush off thousands of acres of land. The meadows in the Hackensack valley, north of Smoke Hill, burned for several days, but no damage to property occurred. About one acre of woodland near Peekskill, Westchester county, was burned.

Milton, Massachusetts, 19th.—Nearly one thousand acres of the Blue Hills have been burned over during the past week, and much damage has been done to standing wood.

Dover, Strafford county, New Hampshire.—The belt of woods near the Great Falls was burning on the 22d.

Saint John's, New Brunswick, 22d.—The forest fires now burning have caused great damage in this province.

Mount Washington, New Hampshire.—The adjacent valleys were filled with dense smoke from forest fires on the 21st, 22d, and 24th.

Bangor, Maine, 30th.—During the protracted dry weather great care has been exercised to prevent the breaking out of forest fires in this state. Although forest fires have been less numerous than during former dry seasons, where they have originated, they have continued until the close of the month. Mount Desert island has suffered seriously in consequence of forest fires.

Yankton, Dakota.—Prairie fires occurred in this vicinity on the 4th and 24th. On the latter date about 1,000 tons of hay were burned near Freeport.

Nephi, Juab county, Utah.—Fires burned on Nebo mountain from the 23d to the end of the month.

Cœur d'Alene, Idaho.—Dense smoke from forest fires prevailed in this locality on the 3d, 24th, 26th, 29th, and 30th.

Fort Canby, Washington Territory, 1st.—Extensive forest fires are burning in this territory and in Oregon. Large

quantities of timber have been destroyed, and the atmosphere filled with dense smoke. These fires have been burning for the last three months.

Poway, San Diego county, California.—Brush fires prevailed in this vicinity from the 21st to the 24th.

Less extensive prairie and forest fires have occurred during the month as follows:

Dayton, Washington Territory.—1st, 22d, 23d, 28th.
Fort Maginnis, Montana.—6th, 23d to 26th.
Los Angeles, California.—24th, 25th.
Deadwood, Dakota.—26th.
Fort Totten, Dakota.—26th.
Fort Smith, Arkansas.—27th.
Fort Bennett, Dakota.—29th.

POLAR BANDS.

Lead Hill, Arkansas, 1st, 6th, 10th, 11th, 13th, 25th, 26th.
Alexandria, Dakota, 16th, 24th.
Archer, Florida, 14th, 17th, 21st, 23d, 25th, 27th, 29th.
Riley, Illinois, 27th.
Wabash, Indiana, 10th.
Yates Centre, Kansas, 9th.
Salina, Kansas, 18th, 23d.
Gardiner, Maine, 11th, 13th, 28th.
Freehold, New Jersey, 10th.
Vineland, New Jersey, 8th, 14th, 17th, 20th.
Portsmouth, North Carolina, 7th, 15th.
Wauseon, Ohio, 28th.
Nashville, Tennessee, 12th, 13th.
Palestine, Texas, 18th, 23d, 24th.
Woodstock, Vermont, 4th, 20th.

The following extract is taken from a communication from Dr. James C. Neal, of Archer, Florida:

I see in Florida, almost constantly, that if polar bands occur in the upper strata, the surface wind blows at a right angle to the bands, *i. e.*, if the axis of the polar bands lies north and south, the wind is east to west or west to east, and in ten or fifteen hours thereafter, the surface wind coincides with the axis of the polar band. If the upper strata of clouds move at a right angle to the lower, in from eight to twelve hours afterward, the surface wind changes to the direction of the upper clouds.

MIGRATION OF BIRDS.

Geese flying southward.—Sacramento, California, 1st; Keokuk, Iowa, 4th; Wauseon, Ohio, 8th; Indianola, Texas, 19th, 21st; Alexandria, Dakota, 20th, 22d; Narragansett Pier, Rhode Island, 22d; Wentworth, Dakota, 26th, 28th; Traverse City, Michigan, 29th; Morriston, Dakota, 29th; Ithaca, New York, 30th.

Flying northward.—Marquette, Nebraska, 24th.

Ducks flying southward.—Red Bluff, California, 14th.

Flying northward.—Des Moines, Iowa, 25th.

WATER-SPOUTS.

Captain H. S. Quick, of the s. s. "New York," reported on the afternoon of September 8th, near N. 31° 45′, W. 80°: "Two water-spouts formed near the ship and were very near together—had to haul the ship northeast to clear them. They travelled from east to west."

Captain Salter, of the ship "Marlborough," reported on September 14th, in latitude 43° 32′ N., longitude 38° W.: "Passed between two water-spouts, which were within a stone's throw of the vessel."

ZODIACAL LIGHT.

Pensacola, Florida, 20th.
Cambridge, Massachusetts, 11th.
Nashville, Tennessee, 1st, 2d, 4th, 6th, 7th, 8th, 10th to 15th.
Palestine, Texas, 21st, 22d, 24th, 25th.

SAND STORMS.

Yuma, Arizona, 9th, 21st, 30th.
Fort Garland, Colorado, 8th.
Huron, Dakota, 20th.
San Carlos, Arizona, 18th, 21st, 22d.

NOTES AND EXTRACTS.

The following meteorological summary has been forwarded by Mr. W. H. Ragan, Lafayette, Indiana, Director of the "Weather Service" of that state:

September, 1882, was chiefly noted for its low mean temperature. The records of this office show the monthly mean temperature of September, 1880, to have been 63°.89; of September, 1881, 70°.82; of September, 1882, 63°.01; and of September, 1883, 61°.22. This is 3°.53 below the average for the four years named, and 4°.71 lower than the average of the three years immediately preceding.

The average September rainfall for the years named is 2.10 inches, while that of September, 1883, is 1.64.

Frosts occurred on the 6th, 10th, and 26th; that of the 10th greatly damaged the late corn and other tender vegetation.

The highest barometer, 30.51, occurred on the 9th; the lowest, 29.74, on the 24th.

The highest temperature, 87°, occurred on the 15th; the lowest, 32°, occurred on the 26th.

The prevailing wind for the month was from the northeast, thirty-five observations out of the ninety showing the wind from this source.

From the reports of thirty-one local observers reporting to this office, the following summary is made:

Average maximum barometer, 29.95; average minumum barometer, 29.29; average mean barometer, 29.78; maximum barometer, 30.51, is reported from Tippecanoe county; mimumum barometer, 28.66, is reported from Henry county; highest mean barometer, 30.47, from Tippecanoe county; lowest mean barometer, 28.96, from Henry county; greatest daily range of barometer, 0.90, from Hamilton county; least daily range, 0.09, from Switzerland county.

Average maximum temperature, 87°.12; average minumum temperature, 42°.06; average mean temperature, 63°.58; maximum temperature, 93°, reported from Spencer county; minimum temperature, 32°, from Tippecanoe county; maximum monthly range of temperature, 58°, reported from Vermillion county; minimum monthly range, 36°, from Hamilton county.

Greatest number of clear days, eighteen for Washington county; least number, one, for Putnam county; greatest number of rainy days, eleven, for Fayette county; least number, two each for Dubois and Washington counties.

Nineteen observers report the maximum temperature for the 15th, and twelve for the 2d. Twenty-six reported the minimum temperature on the 26th; one on the 18th; one on the 27th; one on the 10th; and two failed to report.

Greatest rainfall reported, 5.98 inches for Randolph county; smallest rainfall, 0.15 inches for Gibson county; average rainfall, 1.99 inches.

REPORT OF THE MISSOURI WEATHER SERVICE FOR SEPTEMBER, 1883.

The mean temperature for September has been very near the average, 69.0 degrees, and has been quite uniform and pleasant. The rainfall in and around St. Louis has been less than one-hundredth of an inch for the entire month. This has not happened before, since Engelman began his series in 1839, although in 1871 the September rainfall was only 0.02 of an inch. Other small rainfalls have been, 1867, 0.17 inch; 1844, 0.30, and 1875, 0.33. The normal rainfall at Saint Louis is three inches. The highest September rainfall was observed in 1866, and was 10.53 inches.

Other stations reporting no rain for the past month were Saint Charles and Greenfield. In Mascoutah, Illinois, the fall was 0.03 inch. South of a line running through Clinton and Harrisonville, and passing south of Kirksville and Hannibal, the rainfall was less than an inch. The highest rainfall reported was 2.00 inches, at Pleasant Hill, and 2.15 at Oregon. The lowest temperatures reported are: Boonville, 32°.0 on the 23d; Centreville, 34°.0 on the 9th, Corning, 38.°0. The highest temperature reported was 96°.0 at Harrisonville, 94°.9 at Glasgow, 93°.0 at Warrenton and Mascoutah. Light hoar frosts, the first of the season, occurred at Macon on the 8th, and at Shelbina, Warrenton, Mexico, Macon, Louisiana, Kirksville, Greenfield, and Corning on the morning of the 9th. Later frosts were Saint Charles, Louisiana, Mexico, Ironton, Kirksville on the 10th, Greenfield on the 18th and 23d, Carthage on the 23d, and Macon, Ironton, Corning on the 26th.

The corn crop has not been materially injured by frost except over limited areas on low ground, but it has suffered somewhat for lack of rain, which prevented the ears from filling out properly.

FRANCIS E. NIPHER, *Director.*

WASHINGTON UNIVERSITY, *October* 8, 1883.

WEATHER REPORT FOR SEPTEMBER, 1883.

[Prepared by Prof. F. H. Snow, of the University of Kansas, from observations taken at Lawrence.]

This month was remarkable for having a smaller rainfall, and, with one exception (1868), a lower mean temperature than any other September on our sixteen years' record. Notwithstanding the low mean temperature, the minimum temperature was 13.5 degrees above freezing point, and there was not even the lightest touch of hoar frost.

Mean temperature 63.52°, which is 2.82° below the September average. The highest temperature was 91° on the 1st; the lowest was 45.5° on the 9th, giving a range of 45.5°. The mercury reached 90° only once. Mean temperature at 7 a. m., 57.33°; at 2 p. m., 74.65°; at 9 p. m., 61.05°.

Rainfall 1.25 inches, which is 1.95 inches below the September average.

Rain fell on seven days. There was only one thunder shower. There has now been a rain deficiency for two months in succession, but the abundant precipitation of the preceding months had placed the crops beyond all danger from drouth. The entire rainfall for the nine months of 1883, now completed, has been 32.40 inches, which is 4.60 inches above the average for the same months in the preceding fifteen years.

Mean cloudiness 40.33 per cent. of the sky, the month being 0.31 per cent. clearer than usual. Number of clear days (less than one-third cloudy), fifteen; half clear (from one to two-thirds cloudy), seven; cloudy (more than two-thirds), eight. There were seven entirely clear days and one entirely cloudy. Mean cloudiness at 7 a. m., 50.67 per cent.; at 2 p. m., 44 per cent.; at 9 p. m., 26.33 per cent.

Wind.—Ne., twenty-six times; sw., eighteen times; se., fourteen times; nw., fourteen times; w., seven times; n., six times; e., four times; s., once. The total run of the wind was 9,945 miles, which is eight hundred and twelve miles below the September average. This gives a mean daily velocity of 331.5 miles, and a mean hourly velocity of 13.81 miles. The highest velocity was forty miles an hour on the 21st.

Mean height of barometer, 29.144 inches; at 7 a. m., 29.171 inches; at 2 p. m., 29.120 inches; at 9 p. m., 29.142 inches; maximum, 29.462 inches on the 5th; minimum, 28.906 inches on the 13th; monthly range, 0.556 inch.

Relative humidity.—Mean for the month, 67.8; at 7 a. m., 78.8; at 2 p. m., 49.82; at 9 p. m., 75.05; greatest, 96, on 22d and 23d; least, 25, on the 6th. There was one fog.

Abstract of meteorological observations for the month of September, 1883, as reported to the Bureau of Agriculture, &c., of Tennessee, by voluntary observers in co-operation with General W. B. Hazen, Chief Signal Officer, U. S. A.

County.	Station.	Latitude north.	Longitude west of Washington.	Temperature. Mean of 7 a. m.	Mean of 2 p. m.	Mean of 9 p. m.	Average monthly.	Highest.	Date.	Lowest.	Date.	Wind. Prevailing direction.	Greatest force. Scale 0 to 10.	Date.	Number of days— Clear.	Fair.	Cloudy.	Auroras.	Dew.	Fog	Frost	Lunar halos.	Solar halos.	Hail storms.	Thunder storms.	On which rain fell, including hail, snow, and sleet.	Total rainfall, including hail, snow, and sleet (in inches).	Observers.
Anderson	Andersonville	36 30	6 58	58	78	66	67	91	4	46	27	e.	br.	.....	.....	.....	.....	.....	.....	3	2	.....	1	2	.....	.....	4	3.18	J. K. P. Wallace.
Bedford	Flat Creek	35 30	9 40	62	78	64	67	91	4	47	24	w.	h.	24	12	10	8	.....	.....	.....	4	.....	1	.....	1	1	5	3.05	William Hart.
Blount	Maryville, 960 ft.	35 45	7 00	63	78	69	70	93	4	54	26	w.	h. 9.	8	8	13	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	3.56	W. H. Henry.
Carroll	McKenzie, 515 ft.	36 10	11 30	63	78	69	70	89	4	42	24	nw.	br.4.	28	20	5	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	0.34	John Brown.
Cheatham	Kingston Sp'gs, 500	36 10	10 04	60	80	65	67	89	14	51	10	n.	br.	.....	11	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	0.98	W. J. Inman, 17 ds.
Coffee	Manchester, 1,000 ft.	35 20	9 04	60	78	63	66	90	4	51	26	ne.	br.	4	12	15	3	.....	.....	.....	.....	.....	1	2	.....	.....	5	3.56	Wiley Hickerson.
Coffee	Beech Grove, 1,050 ft.	35 30	9 06	59	76	64	66	91	4	45	26	e.	.....	.....	12	9	9	.....	.....	2	.....	.....	.....	.....	.....	.....	7	3.35	B. F. Cheatham.
Cumberland	Grassy Cove	36 00	8 00	59	76	58	63	87	4	41	11	.....	.....	.....	12	11	7	.....	21	.....	.....	.....	.....	.....	.....	.....	5	2.06	Nettie M. Stratton.
Crockett	Gadsden	35 45	12 00	63	77	69	69	89	2	54	24	sw.	br.	.....	17	9	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	0.27	M. T. Moore.
Davidson	Nashville, 507 ft.	36 11	9 53	.....	.....	.....	69	90	2	50	10	nw.	br.	5	10	13	7	.....	23	7	.....	1	1	1	5	.....	9	2.19	L. N. Jesunofsky.
DeKalb	Smithville (n,r), 700	35 50	8 40	60	77	63	71	86	4	50	10	s.	br.	13	8	6	8	.....	.....	.....	.....	.....	.....	.....	2	.....	4	1.20	P. C. Bluhm, 22 days.
Dyer	Dyersburg	36 15	12 30	57	77	61	64	87	4	40	22	n.	br.	17	14	11	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	0.63	L. Hughes.
Franklin	Estil Springs	35 15	9 00	58	79	61	65	91	4	44	25	n.	.....	.....	10	18	2	.....	.....	.....	.....	.....	.....	.....	4	.....	8	3.78	H. H. Clayton.
Gibson	Trenton, 450 feet	36 00	11 58	59	77	62	65	88	2	41	24	sw.	br.6.	9	15	12	3	.....	.....	.....	.....	.....	1	.....	.....	.....	2	0.96	A. S. Currey.
Gibson	Milan, 440 ft.	35 55	11 46	59	77	63	66	93	2	39	22	s.	br.3.	.....	18	2	10	.....	.....	1	1	.....	.....	.....	1	.....	3	0.70	M. D. L. Jordan, M. D.
Giles	Pulaski, 650 ft.	35 15	10 00	62	79	67	69	91	14	47	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	1.82	W. T. Mann.
Greene	Greenville, 1,581 ft.	36 42	5 50	65	79	72	72	90	5	53	11	e.	l.	.....	23	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1.24	E. Link.
Hamilton	Chattanooga, 783 ft.	35 04	5 15	63	80	68	70	91	4	51	27	nw.	br.	16	10	15	5	.....	2	.....	.....	1	4	.....	3	.....	9	3.40	B. L. Goulding.
Hardeman	Bolivar, 430 ft.	35 18	12 00	60	78	66	67	90	2	50	22	n.	.....	.....	27	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1.15	E. P. McNeal.
Hardin	Savannah, 400 ft.	35 20	11 40	59	79	64	66	91	4	45	24	sw.	l. 2.	.....	25	3	3	.....	.....	.....	.....	2	.....	.....	.....	.....	3	1.79	H. R. Hinkle.
Henry	Paris	36 33	11 25	63	76	69	69	90	2	50	21	w.	br.5.	23	11	8	11	.....	.....	1	1	.....	.....	.....	.....	.....	2	0.73	J. J. Travis.
Humphreys	Waverly	36 00	10 45	57	77	71	69	86	4	42	24	ne.	.....	.....	13	11	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	2.00	D. R. Owen.
Knox	Knoxville, 980 ft.	35 56	6 58	.....	.....	.....	69	92	.....	47	.....	sw.	br.	.....	19	16	4	.....	.....	.....	.....	.....	1	.....	.....	.....	9	2.53	John A. Cody.
Lincoln	Howell	35 15	9 30	60	81	65	70	95	4	50	27	s.	h.	8	6	8	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3.32	O. R. Hatcher, M. D.
Marion	Fostoria, 1,200 ft.	35 10	8 50	55	79	60	63	90	2	42	26	w.	br.	4	18	4	8	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	Charles Foster.
McMinn	Chuckaluck	35 30	7 30	57	80	66	67	88	4	42	11	nw.	l.	.....	22	1	7	.....	.....	.....	.....	1	.....	.....	.....	.....	4	3.45	Jacob Zeigler.
Montgomery	Sailor's Rest	36 24	10 35	.....	.....	.....	.....	.....	.....	.....	.....	e.	br.	.....	19	9	2	.....	.....	.....	.....	.....	1	.....	.....	.....	3	.....	John Minor.
Overton	Livingston, 966 ft.	36 23	8 17	58	77	62	65	89	4	41	11	sw.	br.4.	.....	7	15	8	.....	18	.....	.....	1	.....	.....	4	.....	6	2.13	J. A. Laughlin.
Polk	Parksville	35 10	7 45	60	80	79	74	90	16	44	11	n.	.....	.....	5	6	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	2.86	J. C. Williamson, 20 d.
Rutherford	Florence Station	35 53	9 26	65	82	67	70	92	3	54	26	nw.	l.	.....	14	8	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	1.30	C. F. Vandeford.
Rhea	Grand View, 1,635 ft	35 45	7 48	58	78	60	64	90	4	32	11	sw.	br.4.	24	11	11	8	.....	23	4	1	1	.....	1	4	.....	5	1.39	Hattie R. Stratton.
Smith	Riddleton, 548 feet	36 19	9 07	60	76	66	67	90	15	45	11	sw.	h.	10	12	6	12	.....	21	.....	.....	1	1	.....	1	.....	4	1.86	S. P. Fergusson.
Smith	Alexandria (near)	35 30	8 56	66	.....	69	.....	82	3	54	9	n.	br.	.....	5	12	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	0.74	Irenus Beckwith.
Tipton	Covington	35 30	12 38	60	80	65	67	94	2	50	23	n.	br.4.	24	20	7	3	.....	.....	.....	.....	1	.....	.....	1	.....	2	1.20	T. W. Roane, M. D.
Williamson	Franklin, 650 ft.	35 50	9 48	60	73	66	66	87	4	48	24	n.	br.	.....	13	6	12	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	2.52	Samuel Henderson.
Warren	McMinnville, 950 ft.	35 45	8 45	60	76	64	66	86	4	49	26	n.	br.	25	10	9	11	.....	5	.....	.....	1	.....	.....	1	.....	5	3.68	R. M. Reams.

Report of the Ohio meteorological bureau. Summary for the month of September, 1883.

Number.	Stations.	Counties.	Mean barometer.	Highest barometer.	Date.	Lowest barometer.	Date.	Range of barometer.	Mean relative humidity.	Mean temperature.	Highest temperature.	Date.	Lowest temperature.	Date.	Range of temperature.	Mean daily range of temperature.	Greatest daily range of temperature.	Date.	Least daily range of temperature.	Date.	Number of clear days.	Number of fair days.	Number of cloudy days.	Days on which rain fell.	Total rainfall for month.	Average daily rainfall.	Direction of wind.
1	Cincinnati	Hamilton	30.062	30.402	9	29.767	24	.635	68.0	66.7	88.0	2	46.0	26	42.0	16.5	29.0	27	7.5	20	11	12	7	12	1.83	.061	ne.
3	Dayton	Montgomery	30.082	30.392	9	29.683	24	.709	73.4	62.7	87.0	2	39.0	9, 10	46.0	22.1	33.0	7, 27	11.3	21	16	9	5	8	2.38	.079	ne.
4A	Wapakoneta	Auglaize	30.109	30.466	9	29.676	24	.790	70.7	62.0	92.5	15	31.0	9	61.0	25.8	40.0	11, 12	9.0	21	11	8	11	7	2.70	.090	sw.
4B	Sidney	Shelby	.....	.....	.....	.....	.....	.....	76.8	60.5	90.5	15	25.0	9	61.5	31.5	47.5	15	11.5	17	8	11	6	9	3.69	.123	ne.
5	Upper Sandusky	Wyandot	30.083	30.426	9, 10	29.726	24	.700	73.6	61.7	87.0	15, 16	34.0	9	53.0	22.5	33.0	4, 11	8.0	21	10	10	12	12	1.44	.048	sw.
6	Wauseon	Fulton	30.033	30.390	10	29.610	24	.780	81.0	57.2	89.1	15	28.8	26	60.3	27.2	39.7	11	7.0	21	8	14	8	12	2.96	.099	ne.
7	Lebanon	Warren	.....	.....	.....	.....	.....	.....	76.6	65.1	90.5	15	38.0	26	52.5	23.5	36.0	27	14.0	17, 26	12	13	6	7	2.26	.079	.....
8	N. Lewisburg	Champaign	.....	.....	.....	.....	.....	.....	70.1	63.1	89.0	14	36.5	9, 10	52.5	23.6	33.5	27	13.0	25	10	11	9	9	2.65	.088	w.
9A	Levering	Knox	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.25	.142	.....
9B	Gambier	Knox	30.026	30.393	9	29.567	24	.826	75.2	59.4	84.0	15, 16	33.0	10	51.0	22.6	39.0	11	11.0	25	8	7	15	11	3.30	.110	.....
10	Toledo	Lucas	30.050	30.431	9	29.585	24	.846	70.2	60.6	82.0	2	37.0	9	45.0	16.6	24.0	4, 11	6.0	21	10	17	3	12	2.78	.093	ne.
11	Ironton	Lawrence	30.005	30.305	9	29.755	23	.610	74.7	67.6	87.0	15, 16	40.0	10	47.0	28.3	36.0	7, 26	12.0	23	12	5	13	6	3.53	.118	n.
12A	Washington	Fayette	30.035	30.345	9	29.662	24	.683	71.5	64.3	86.6	15	37.8	10	48.8	24.9	35.7	12	13.5	21	11	11	8	14	1.59	.053	ne.
12B	Waverley	Pike	.....	.....	.....	.....	.....	.....	74.7	64.9	97.2	15	32.0	9	62.5	34.3	55.0	14	16.6	5	18	11	1	9	0.75	.025	w.
13A	Columbus	Franklin	30.053	30.398	9	29.664	24	.734	66.2	63.1	88.0	16	39.0	9	49.0	20.0	31.0	11	10.0	19	10	11	9	13	2.43	.081	s.
13B	O. S. University	Franklin	.....	.....	.....	.....	.....	.....	79.6	61.5	93.0	15	34.0	9, 26	59.0	25.6	45.0	11	9.0	17	10	12	8	11	3.13	.104	nw.
13C	Westerville	Franklin	30.068	30.410	9	29.680	24	.730	82.4	60.3	80.0	10	34.0	9	52.0	24.8	39.0	11	9.0	17	9	11	10	13	2.47	.082	n.
14	Oberlin	Lorain	30.108	30.480	10	29.626	24	.854	83.6	58.2	88.5	16	31.5	10	54.0	22.4	36.7	11, 12	9.0	25	.....	.....	.....	14	4.97	.160	.....
15	Marietta	Washington	30.092	30.415	9	29.687	24	.728	77.1	64.5	89.8	16	39.4	9	50.4	24.3	36.3	27	12.0	19	10	7	13	7	2.75	.092	nw.
16	Granville	Licking	.....	.....	.....	.....	.....	.....	66.4	63.6	89.0	14, 15	36.7	9	52.3	23.6	35.0	4	10.0	25	10	13	7	8	2.63	.088	nw.
17	Quaker City	Guernsey	30.071	30.385	10	26.643	24	.742	76.2	63.5	88.0	16	34.5	9	53.5	23.7	33.0	7	12.0	19, 25	11	11	8	11	2.38	.079	n.
18	Canton	Stark	30.082	30.421	9	29.630	24	.791	76.5	59.3	87.2	16	32.8	10	54.4	23.5	36.7	11	12.4	28	7	10	13	14	1.71	.057	sw.
19	Warren	Trumbull	.....	.....	.....	.....	.....	.....	78.0	58.6	85.3	16	31.0	10	54.3	22.4	35.3	11	11.4	25	6	13	11	14	2.72	.091	ne.
20	Wooster	Wayne	29.997	30.367	9	29.613	24	.754	77.9	61.4	93.0	15	36.0	26	57.0	24.2	38.0	18, 26	6.5	30	10	7	13	13	2.95	.098	ne.
21A	Cleveland	Cuyahoga	30.054	30.431	10	29.562	24	.869	67.1	59.5	80.7	16	38.5	10	48.2	16.7	29.8	4	6.7	25	7	13	10	17	4.03	.134	se.
21B	Cleveland	Cuyahoga	.....	.....	.....	.....	.....	.....	.....	59.0	87.0	16	36.0	10	51.0	19.2	31.5	4	9.0	25, 30	8	10	12	16	4.35	.145	ne.
	State	.....	30.063	30.480	10	29.562	24	.918	74.6	61.5	97.2	15	25.0	9	72.2	23.4	55.0	14	6.0	21	10.3	10.7	9.	10.8	2.72	.093	ne.

NOTE.—The means are computed only from station reports covering the entire month, and when instruments have been compared with standards.

Direction of wind.

ne.
ne.
sw.
ne.
sw.
ne.
.....
w.
.....
ne.
n.
ne.
w.
s.
nw.
n.
.....
nw.
nw.
n.
sw.
ne.
ne.
se.
ne.
ne.

Global Threats of Low-Enriched Arms Speculation: How

Chart I. Tracks of Low-Barometer Areas. September, 1883.

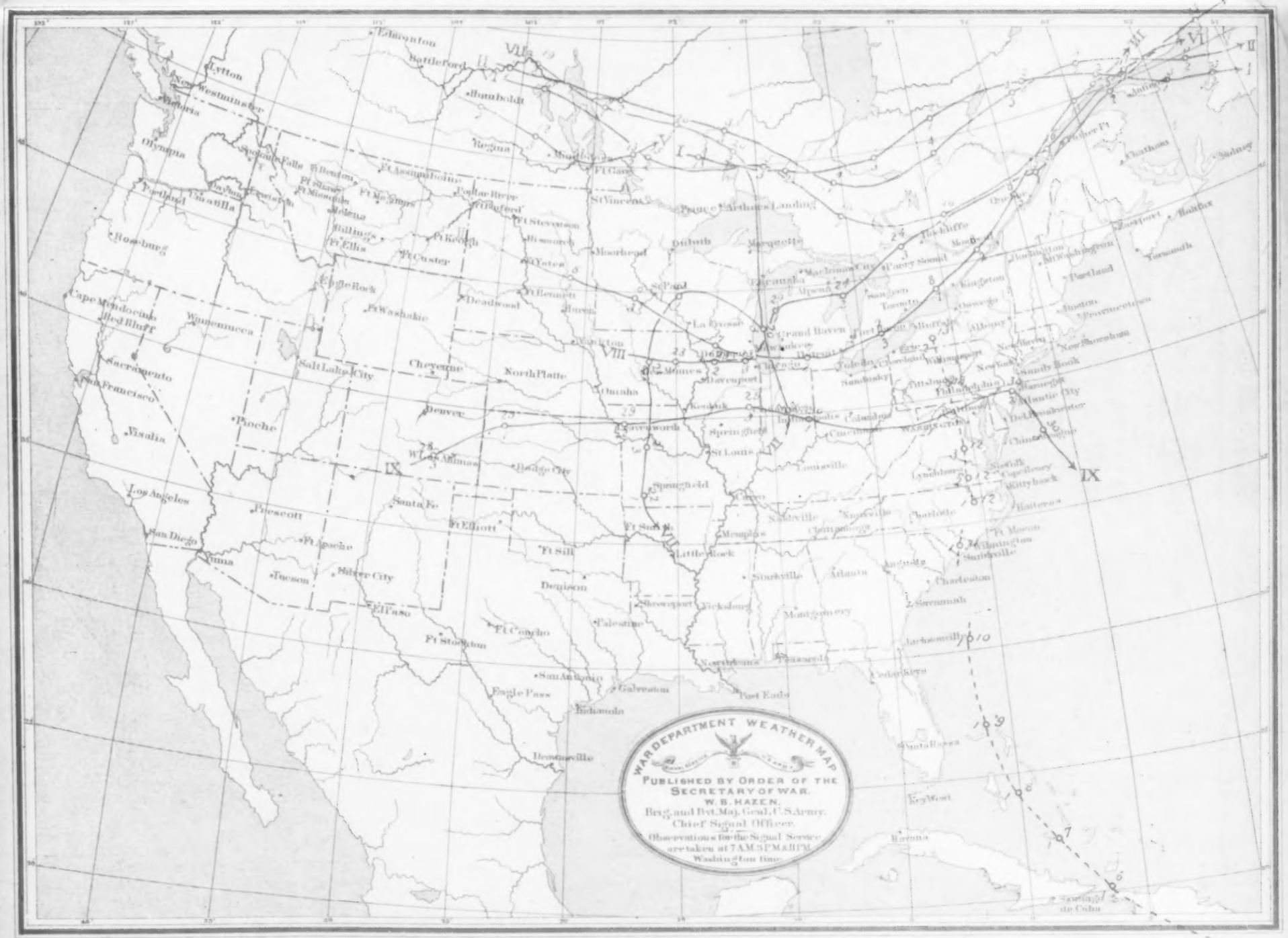
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Genl. U.S. Army.
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M. Washington time.
Edmonton
Battleford
Humboldt
Lytton
New Westminster
Victoria
Olympia
Portland
Walla Walla
Ft Assiniboine
Ft Maginnis
Ft Missoula
Helena
Ft Keogh
Ft Custer
Ft Ellis
Ft Stevenson
Bismarck
Ft Yates
Ft Buford
Fort au Rivre
Ft Lapwai
Ft Washakie
Deadwood
Ft Bennett
Eagle Rock
Roseburg
Cape Mendocino
Red Bluff
Wadsworth
Winnemucca
Sacramento
San Francisco
Visalia
Salt Lake City
Cheyenne
North Platte
Omaha
Denver
Ft Lyon
Ft Dodge
Ft Riley
Ft Leavenworth
Springfield
St Louis
Davenport
Des Moines
La Crosse
St Vincent
St Paul
Duluth
Moorhead
Minnedosa
Qu'Appelle
Prince Arthurs Landing
Marquette
Grand Haven
Milwaukee
Detroit
Toronto
Machiniac City
Parry Sound
Kingston
Ottawa
Albany
Boston
Portland
Yarmouth
Sydney
Charlottetown
Quebec
Father Pt
Rimouski
Los Angeles
Prescott
Ft Apache
Ft Elliott
Ft Sill
Ft Supply
Santa Fe
San Diego
Yuma
Tucson
Silver City
El Paso
Ft Concho
Ft Stockton
Denison
Palestine
Galveston
San Antonio
Eagle Pass
Brownsville
Indianola
Port Eads
Little Rock
Memphis
Nashville
Louisville
Cincinnati
Columbus
Indianapolis
Chicago
Milwaukee
Toledo
Cleveland
Buffalo
Pittsburgh
Philadelphia
Harrisburg
Atlantic City
Baltimore
Washington
Norfolk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Tallahassee
Montgomery
Vicksburg
Shreveport
Natchez
Meridian
Starkville
Atlanta
Augusta
Key West
Havana
Santiago de Cuba
Santa Rosa
Pensacola
Mobile
New Orleans
Sandy Hook
Block Island
Nantucket
Kittyhawk
Sandusky
Escanaba
Marquette
Alpena
Mackinaw City
Port Huron
Grand Haven
Milwaukee
Chicago
Detroit

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Chart II. Ocean Storm Tracks. September 1883.

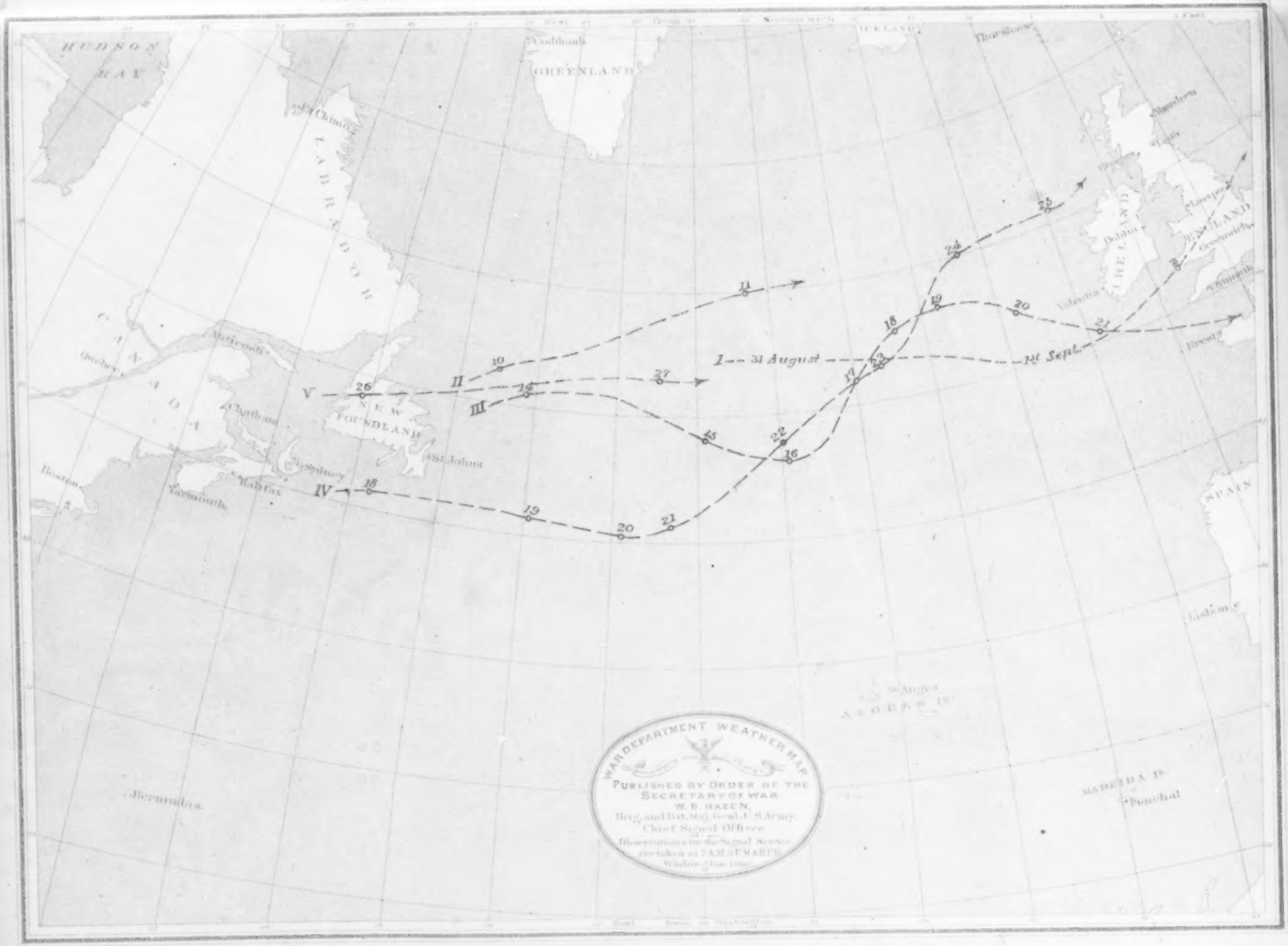

Chart III. Isobars, Isotherms, and Winds. September 1883.

Chart III. Isobars, Isotherms, and Winds. September, 1883.

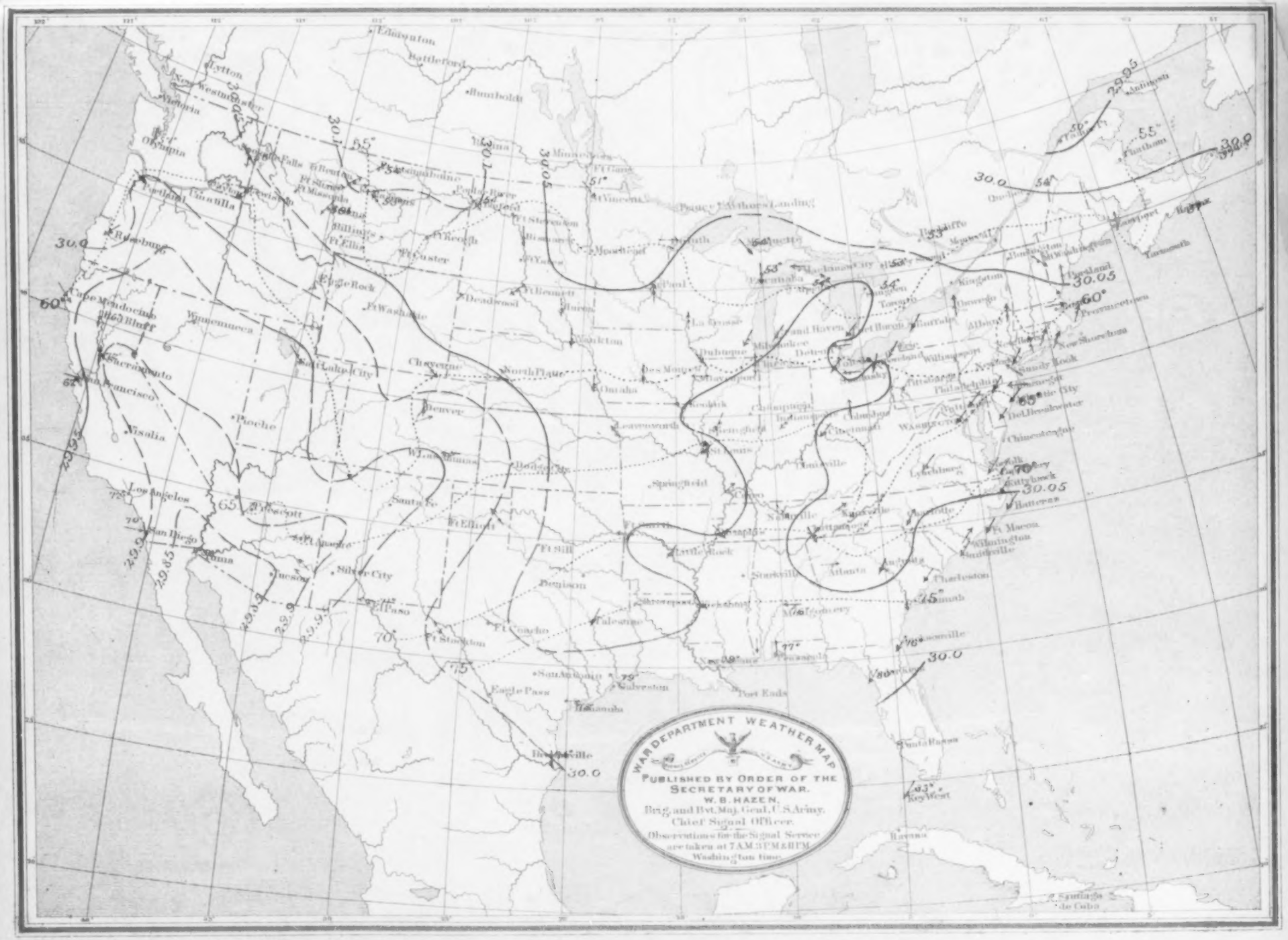
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Chart IV. Precipitation, September 1883.

Chart IV. Precipitation, September 1883.

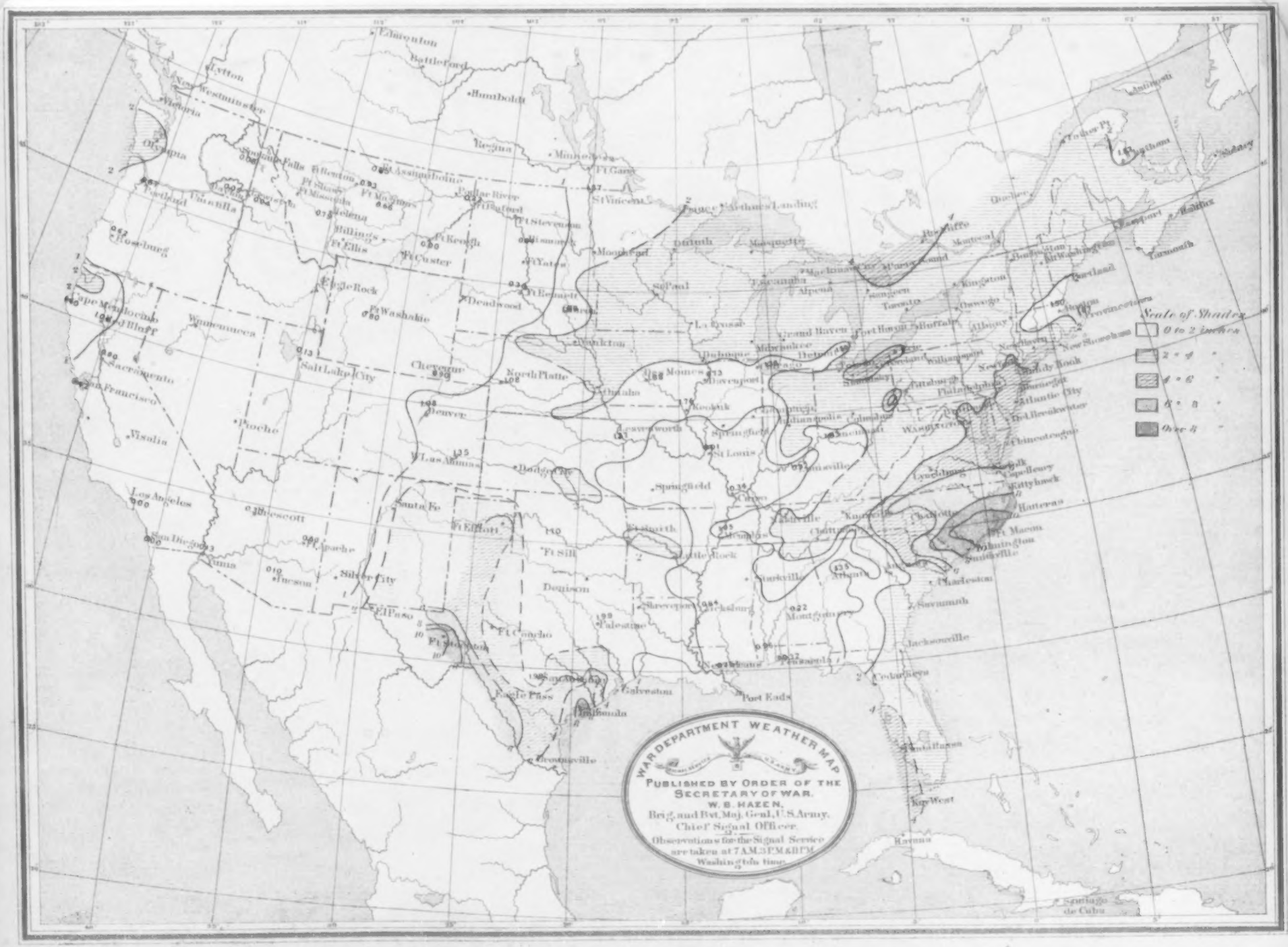
Scale of Shading
0 to 2 inches
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
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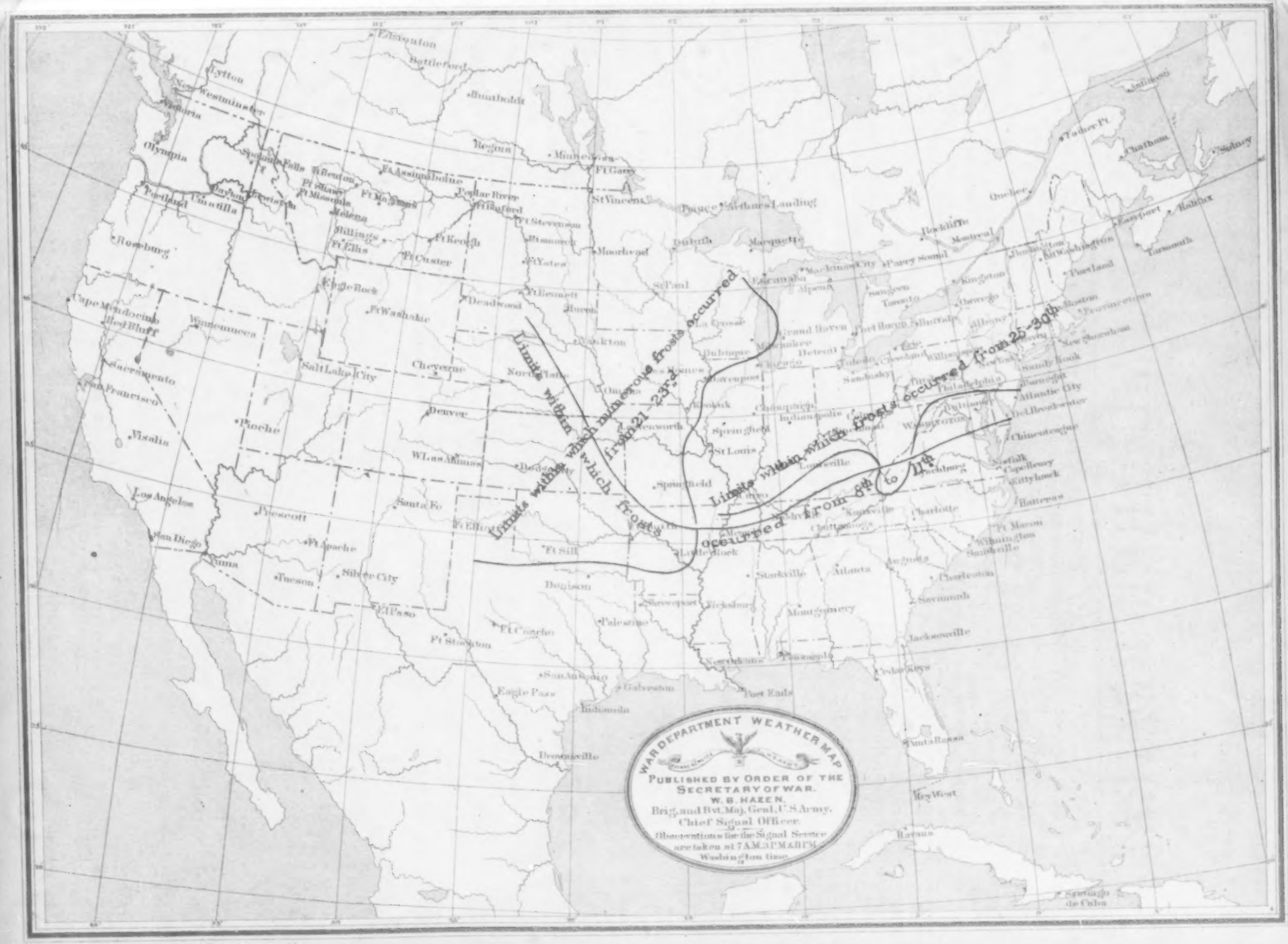
Chart V. Limits of Frosts. September, 1883.

Chart V. Limits of Frosts. September, 1883.


Limits within which numerous frosts occurred from 21 - 23d.
Limits within which frosts occurred from 6th to 11th
Limits within which frosts occurred from 25 - 30th
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